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POLLUTION OF RARITAN BAY AND ADJACENT INTERSTATE WATERS. PROCEEDINGS OF CONFERENCE, THIRD SESSION, HELD AT NEW YORK, NEW YORK ON JUNE 13-14, 1967. VOLUME 3

Federal Water Pollution Control
Administration
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CONFERENCE
Pollution of Raritan Bay and adjacent Interstate Waters

THIRD SESSION
NEW YORK, NEW YORK
JUNE 13-14, 1967

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L WATER POLLUTION CONTROL ADMINISTRATION • U. S. DEPARTMENT OF THE INTERIOR

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→ The Report on the

Third Session of Conference in the Matter of Pollution of Raritan Bay and Adjacent Interstate Waters, convened at the Waldorf-Astoria Hotel, New York, New York, on Wednesday, June 14, 1967, at 9:15 a.m.

includes statements, discussions, and recommendations on contamination of [illegible] shellfish sanitation; preparation of shellfish for marketing; and related infor

PRESIDING:

Mr. Murray Stein, Assistant Commissioner for Enforcement, Federal Water Pollution Control Administration, Department of the Interior

CONFEREES:

(As heretofore noted.)

PROCEEDINGS

MR. STEIN: May we reconvene?

As indicated yesterday, there are two more statements from New Jersey, so we will call on Dr. Kandle for these presentations, following which we will go to New York.

Dr. Kandle?

DR. KANDLE: We would like to hear first from Mr. Benjamin Karmatz, who is going to speak for the New Jersey State Federation of Sportsmen's Clubs.

STATEMENT OF BENJAMIN KARMATZ, DELEGATE, NEW JERSEY CENTRAL COUNCIL OF SPORTSMEN'S CLUBS, HIGHLAND PARK, NEW JERSEY

MR. KARMATZ: I am Ben Karmatz from Highland Park, New Jersey.

I am a member of the Fact-Finding Committee of the Central Jersey Council of the Sportsmen's Federation, substituting for Mr. Ronald Spevack of Perth Amboy, the scheduled speaker for the New Jersey State Federation of Sportsmen's Clubs.

What I am about to say I will preface with these remarks, that neither I nor our organization have any personal animosity to any particular body or persons in the State of New Jersey, especially those involved in water pollution and in the area of the cleansing of the waters of the State, to be made fit for human use, whether it is salt water or fresh water.

I will start off with the preface of a question: Is it in the public interest to have legislators who are members of law firms that are defending industries charged with pollution of State and interstate waters? These legislators may influence water pollution legislation.

What action will be taken by the State of New Jersey against industries and power companies that discharge thermal water, devoid of oxygen, into the State and interstate waterways?

Two and a half million dollars of Green Acres' funds have been spent in the Middlesex-Somerset-Monmouth County areas in the Raritan Valley. Yet, we have a daily flow of 90 million gallons of sewage into the waters of the Raritan River by permission of the State Department of Health.

$58 million have been spent building and maintaining the Middlesex County Sewerage Authority. An additional $30 million is needed for a secondary treatment plant. This money will be wasted if the pollution laws of the State are not enforced.

There has been very little legal action in this area in the past ten years. Water pollution, the discharge of deleterious wastes, have increased by 15 percent in five years in the State of New Jersey.

Reports to the Fish and Game Division and other State agencies showing pollution of waterways in the State only have met with what I call "bafflegab" action -- "bafflegab" -- which means procrastination and double-talk.

The polluted water flows in the Raritan Bay, an interstate water, as you know.

The New Jersey Federation of Sportsmen's Clubs urge the Federal Government to maintain a strict surveillance on Federal funds allocated for water pollution control to prosecute polluters without procrastination, the desecrators of our precious commodity. It is not a luxury; it is a necessity.

We urge the Federal Government to take immediate action to prevent the worsening of water pollution before the 1970 deadline.

MR. STEIN: Thank you.

Are there any further comments or questions?

(No response.)

MR. STEIN: Thank you very much.

Dr. Kandle?

DR. KANDLE: We would now like to hear from Mr. Meseroll, who will be speaking for the Raritan Valley Clean Water Association.

STATEMENT OF STANLEY MESEROLL, CHAIRMAN, RARITAN VALLEY CLEAN WATER ASSOCIATION, HIGHLAND PARK, NEW JERSEY

MR. MESEROLL: With your kind permission, I would like to make a statement, and then just ask two questions.

MR. STEIN: Mr. Meseroll, may we have your full name for the record?

MR. MESEROLL: Stanley Meseroll of Highland Park New Jersey, Chairman of the Raritan Valley Clean Water Association.

MR. STEIN: Thank you.

MR. MESEROLL: The statement I am about to make represents the views of more than 50,000 citizens in the Raritan Valley area, and some 70 civic organizations and sportsmen's clubs that we represent.

Our association would first like this conference to know that we're pleased to see that some progress is being made with pollution in the Raritan Bay. This progress seems to be mostly in research. This progress, to us laymen, seems uncommonly slow, since this conference was originally scheduled to be held two years ago. However, we feel that efforts are needed not so much in the scientific field, but rather in the field of enforcement of present anti-pollution laws, especially in regard to the entire -- not just the lower -- Raritan River.

Study after study, test after test, survey after survey, report after report, all reveal what we all know -- have known for years -- that these waters are horribly polluted. Indeed, our own association has reported some 30 cases of pollution in the Raritan Valley to the State Department of Health. We have seen little action to end this pollution to date. Stopping a large percentage of this pollution, as we see it, is not a complex problem. It is just a matter of enforcing existing laws. Despite cajoling, pleading, letter writing, bona fide testing of water, requests of officials from the local boards of health all the way up to Senator Case, almost every industry we have named -- even small trucking firms whose waste problems are not complex nor costly to correct -- is still allowed to violate present pollution laws. Only five industries in this area have been taken to court by the State since the last conference was held. One of these plants has been polluting since 1958.

And a Superior Court judge has given them another eight months to correct their pollution. This is almost farcical.

While the State has finally issued timetables for construction of waste treatment plants for 10 industries on the lower Raritan, who is to say that these timetables will not be extended again -- as all timetables to date seem to have been -- in 1968 and 1970. This is the pattern for pollution in New Jersey.

We know that treatment of industrial waste is expensive, difficult, time-consuming. We also know that to shut down industries -- or even certain manufacturing processes within a plant -- can be costly but costly to whom? To the industry, of course. But we submit that the economic losses due to this "pollution by permit" far transcends -- amounts to far more -- than the losses that would be incurred if our anti-pollution laws were enforced. Why do we even have such laws if they are not enforced?

We do not mean to minimize the importance of research. But we do feel that more progress might be made if similar concerted efforts were made to enforce existing laws on the Raritan River as have been made in research and the study of sources of pollution. Such efforts should be made on the entire river -- not just the lower end of the Raritan. Which brings us to our two questions:

1. Can anything be done by this conference or

the Federal Government to encourage or force the State of New Jersey to take further action against polluters along the lower Raritan River and in the Arthur Kill area?

2. The Raritan Bay will still be seriously polluted, even with all pollution in the Arthur Kill and the lower Raritan stopped, as long as industries on the upper Raritan are allowed to continue dumping improperly treated waste into the Raritan River. No effective directives, to our knowledge, have been given industries such as American Cyanamid's Calco plant to improve their treatment facilities.

I notice by your summary that they have been given some orders, what I have referred to as appropriate orders to have some facilities completed by 1966. They have not complied with these orders. It is a year and a half since then and we still hear nothing.

The question is: Is there anything that the Federal Government or this conference can do to stop industry from polluting the upper Raritan River?

Just as an addenda, in reading over your summary of the conference report, I notice on Page 1 that they refer to the problem being on the western section of the Raritan Bay as municipal waste. I suggest that they add the words "industrial waste."

Thank you.

MR. STEIN: Are there any comments or questions?

(No response.)

MR. STEIN: If not, let me try to make a comment on your questions.

No. 1, I hope we are working for the State of New Jersey, and we are going to encourage them. I don't think we have to force them. You have to put this problem in persecptive.

New Jersey is not polluting those waters. We are at the conference stage dealing with New Jersey. If we have to go to the next stage of the Federal Enforcement action, and I hope we won't because we have done that very seldom -- but if we have to go to the hearing stage, the Federal Government proceeds against the individual polluters, that is, the industries and the municipalities involved.

There is also a tendency to talk in terms of a State, but you have to recognize that New York State and New Jersey are not the polluters here. They are municipalities and industries. These are the people whom we would proceed against. If there were any mandatory regulatory action, it would be directed against these groups and not the States.

As far as I can see, we have worked very closely with both States and the Interstate Agency, and we would hope to continue to work with them.

In the past, we and several States have had to take regulatory action against individual polluters, and in all these cases we have worked in concert with the States involved. I don't think you are going to find a real difference between the States and the Federal Government.

Among the professional staffs, as you can tell here, there are always some differences, but I think what we are trying to do is get a methodology where we are going to have clean water. We are operating in a very delicate area, and this is why we have these conferences. There should be a Federal-State-local relationship.

Our object here is not to force anyone, but to try to get all people to agree on a cooperative schedule, which will be carried forward.

Again, I cannot speak for your area here, but it has been my experience in dealing with cities and in talking with city officials and knowing the industries involved, that once we have agreed on what has to be done, on a schedule to be followed through, we find that those cities and industries have, in almost all cases, complied.

When you talk about the schedules, you have to remember one thing. We look at this as we are operating in a democratic society. Whatever the field, including water pollution, whatever the issue, every man has to have his right to appeal to court. That applies to everyone, and I don't care what you say he did or whatever the situation is.

In our system of government, it would be a really terrible thing if the people representing the Executive Departments in either the States or the Federal Government, had the last say.

If we assume, as we hope we can under our system, that everyone has the right to go to court, then you have to expect that the court very often may modify the judgment of the Executive agency. If the court gives an extension, this is the court's reason for doing it.

Again, let me give you just an example of what we do in the problem we are discussing. When we deal with water pollution control, as you perhaps have heard from several of the groups, we are dealing with public works or industrial works of tremendous magnitude. Our experience has been that it is easier, because of the nature of the beast, for industries, no matter how large the job is for the industries, to keep on a time schedule more easily than a city.

The reason for that largely is that the industry deals with private financing, and sometimes the industry's treatment works may run into the magnitude of three, four or perhaps five million dollars.

On the other hand, when we deal with a municipality, we are dealing with public financing. You have to have voter approval or have approval of your budget by a Board of Estimate; you have a lot of land acquisition; and these projects take a long time.

Our experience has shown that if a project takes a year to build, it takes about a year to plan. If it takes two years to build, there are two years of paper work before you can get to work. In other words, you can double the time it takes to build before you are in operation, and this takes a long time.

There are many pitfalls in putting through a public project which you have to wait for. This isn't just true with a waste treatment project. Look at any large public project, such as the roads or other projects.

Again, in dealing with a public works program, I think we have to be reasonably sensible about this operation and reasonably flexible about it.

This does not mean that year after year after year you give extensions and have delays. If you have examined the record, at least of the Federal-State conferences we have had involving some 1,200 cities and some 1,200 industries, by an large, the very, very vast majority are on schedule.

We have not set a schedule for New Jersey yet. We have not agreed on a schedule among the conferees on the Raritan Bay.

In other words, these are the Federal schedules. That is what we hope we are going to try to do at the conclusion of this conference. However, where we have had this in other areas, we have moved ahead.

I also think you have to recognize that there have been places where the issue has come before the voters and the voters vote it down. Then we have to readjust. This is something we have to do.

This just does not happen on a local level. There have been places in the States where the State has not got the money, or, as you heard yesterday, people were saying that they would like a little more money to come from the Congress. Sometimes this does not happen. However, taking those into account, I think by and large we have set a schedule.

Again, this is one of the recommendations made by our investigators. This is one of the techniques we have used, and I hope the conferees will give these careful consideration.

What we do is, after one of these is set, we schedule six-month periodic progress meetings, which are open so that everyone, interested groups like yourself, the press, the radio, your congressional delegations and State legislative delegations, can judge how we are doing our job when we lay the problem out.

The question of pollution control, because we are dealing with a public works program, and being so long, just starts once we get on a schedule. After we get that, it is going to take hard work and tremendous diligence working on this from time to time to get this through.

As far as I can see, I am very hopeful that we will be able to work out an amicable State-Federl-local program.

In the past few years, working with an interstate problem here, I know of no problem that has come up between the interstate agencies and the States and the Federal Government and localities that was not amenable to reasonable solution, and where we have not been able to sit down around the table and work something out.

Obviously, there are always going to be some differences, but I think we see the makings of a pollution control program.

Of course, we are in the business so long, as I have said. We have been here quite a long time. The reason we are here largely is because of the complications and the complex nature of the problem.

When we started in 1961, I was not sure we could see daylight, see where we were going, and that we had the makings of a pollution control program. The way we are sitting here today, I think we are dealing with relatively minor technical differences. I see the makings of a program. This is a question of putting this together and all operating with good will, and giving full faith and credit to the industries, the cities and the local officials involved, to see if we can do it. This is the only way we are going to handle that program.

Mat Adams pointed out yesterday what one of the major difficulties is. In order to be equitable, we have to be uniform. For example, we can't proceed against that little trucker because he has an easy problem, while a tremendous polluter upstream or downstream is pouring his wastes in untreated.

They all have to move in concert and together. In order to move in concert and together in a complex metropolitan area like this, it is going to take the vigilance and the good will of all the parties. When I say "good will," I don't mean uncritical good will. You have to watch this very closely.

However, I think we are on the brink of putting together the makings of a major pollution clean-up program in the Raritan Bay area. I would hope that if we do that, we can elicit the support of all of you so that it can become a reality.

MR. MESEROLL: Well, as we see it, and we are just laymen, there should be a time -- some kind of an upper limit -- on the extensions and extensions and extensions.

MR. STEIN: I could not agree with you more. But this is the question of setting a time schedule and seeing if they are moving ahead.

Again, I want to state this: There has been a tremendous amount of activity, as you can see here, in working and putting this together.

This is always the problem. As I told you, if we have a four-year program, for two years we do not throw any dirt because we are just fooling with papers. That is just as important, because if we don't do that work carefully, you are not going to have a system that works.

Even when you begin throwing dirt, until you throw the switch on the plant in the pollution business, you are not going to see an improvement in the water.

I recognize for people who are not full-time professionals in this area, when we are in that stage of making plans and specifications, getting the financing lined up, getting the contracts let, acquiring the sites and the right to them, you are apt to be very impatient.

MR. MESEROLL: Sir, this has been going on on the Raritan River for thirty years.

DR. KANDLE: And there is improvement.

MR. KARMATZ: I think there is a point of discussion where we feel the State Department of Health and other agencies, the Conservation Development Division, and Fish and Game, have been dragging their feet in the prosecution of polluters that have polluted not only for one year, two years, but five and eight years.

We have had records of 28 polluters and we have turned in reports.

DR. KANDLE: With steady improvement.

MR. KARMATZ: With steady improvement on having five --

DR. KANDLE: With steady improvement. I insist that there is steady improvement.

MR. KARMATZ: I beg your pardon.

DR. KANDLE: I have the record in my office. I am responsible. I will stand on the record.

MR. KARMATZ: I can also stand on the record, where in the State of New York they are prosecuting three to five cases per day on pollution. We have companies, industries in New Jersey who are not only polluting the air, but polluting the water.

DR. KANDLE: I stand on the record of improvement.

MR. KARMATZ: We also have it that your record shows that all these companies who are polluting have permits from the State Department of Health, and those permits have never been rescinded. Those records have never been changed.

MR. STEIN: Pardon me. I think the issue is clear.

The conferees, I am sure, will make the records available. Dr. Kandle has indicated there is nothing like the record here. I am sure the record will speak for itself.

Do we have any other people from New Jersey, Dr. Kandle?

DR. KANDLE: No, sir.

MR. STEIN: I think Mr. Klashman has one other Federal representative.

MR. KLASHMAN: Is Mr. Albert Kachic here?

MR. KACHIC: Yes.

MR. KLASHMAN: Mr. Kachic is the Assistant Regional Hydrologist, with the United States Weather Bureau.

STATEMENT OF ALBERT S. KACHIC, ASSISTANT REGIONAL HYDROLOGIST, UNITED STATES WEATHER BUREAU, EASTERN REGION, ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION, GARDEN CITY, NEW YORK

MR. KACHIC: I am Albert S. Kachic, Assistant Regional Hydrologist, Weather Bureau, Eastern Region, Environmental Science Services Administration, Garden City, New York.

The conclusions and recommendations as outlined in the Summary Report for the Conference on Pollution of Raritan Bay and Adjacent Interstate Waters (Third Session) properly emphasize the structural approach as a means of pollution abatement. However, under certain circumstances, the non-structural approach to the problem can provide remedial aid or enhance the recommended structural approach. One of the non-structural approaches is the continuous flow forecast.

Under certain circumstances, the availability of information on anticipated fresh water flows can be useful for managers or planners of pollution abatement programs.

For example, the Ohio River Valley Water Sanitation Commission (ORSANCO) utilizes the Weather Bureau

(WB) river forecasts for planning waste storage and/or releases during low flow periods. On other occasions ORSANCO has utilized velocity forecast to locate and keep track of accidental spillage.

The Weather Bureau has three river forecast points within the Raritan River Basin and two within the limits of the study reach, as indicated in the Summary Report. At present, these are only flood forecast points. Bound Brook and Manville are located on the main stem of the Raritan, within the limits of the study reach. Blackwell Mills is on the Millstone River, a tributary of the Raritan. New program capability has become available with the expansion of the River Forecast Center at Harrisburg, Pennsylvania, and the Weather Bureau Office at Trenton, New Jersey. These offices will have the capability of providing the following:

(1) Three or four-day flow forecasts on a daily basis.

(2) Thirty-day mean flow forecast (including forecast temperature and precipitation from 30-day weather outlook). The mean flow forecast presently provided by the Weather Bureau in the Delaware and Susquehanna River Basins has an accuracy on the order of ± 10 percent. This is a new project that we

did at this time.

(3) Calendar year mean flow forecast (issue date April 1). The accuracy of this forecast presently provided by the Weather Bureau in the Delaware and Susquehanna River Basins is in the order of ± 6 percent. These are from preliminary studies we have done. The river forecasting for New Jersey, the Delaware and Susquehanna Basins is done by the Federal State River Forecasting Service at Harrisburg, Pennsylvania, in cooperation with the Pennsylvania Department of Forest and Waters. The expansion, previously mentioned, includes the addition of several hydrologists to the River Forecast Center at Harrisburg, Pennsylvania, and the addition of three more people to our Weather Bureau office at Trenton, New Jersey.

In addition, the River Forecast Center is presently converting to computer operations on a rented computer. Negotiations are under way for the purchase of an IBM 1130 computer to be delivered sometime in fiscal year 1968. At the same time, we are expanding our quarters.

The Weather Bureau office at Trenton, New Jersey, is the service office for this area. It is responsible for data acquisition and the dissemination of river forecasts in New Jersey and the Delaware River Basins. Mr. William Long, who is here, Meteorologist-in-Charge at Trenton, New Jersey, can be contacted to discuss any service requirements that are required.

The Weather Bureau will cooperate in efforts to coordinate these programs with those of other agencies to effect a comprehensive program in pollution abatement and control in this area.

Thank you.

MR. STEIN: Thank you, Mr. Kachic.

Are there any questions or comments?

(No response.)

MR. STEIN: As you know, we have used systems such as this out in the West, and I think as far east as the Missouri River. I think this is coming east.

The question here is when we are dealing with regulated rivers, it is very important to regulate the flow.

I think the Missouri will give you the best example of what we do. We have a large station run by the Corps of Engineers in Omaha and we maintain certain flows in the Missouri River, during the navigation season 13,000 cubic feet a second, and dropping off in other than navigational seasons.

Of course, you need water sometimes for quality control too. We have these tremendous dams, not quite up on the headwaters of the Missouri, but up on the top of the Missouri in Garrison, and so forth. We like to keep the water in the dams for recreational purposes, and the farmers like to have it, but there are certain regulated releases.

When we get a report from the Weather Bureau, for example, of a local storm on a tributary and are able to take advantage of that water and predict when it will come down, we can preserve the water in the dam up above and utilize the water coming in from one of the tributaries, and so maintain a very equal flow.

This kind of system, in cooperation with the Weather Bureau, is worth its weight in gold as far as maintaining water quality is concerned, and we are delighted to have the indication of the services being available.

MR. KACHIC: I would like to emphasize that this does not solve the problem, but it is a tool that can be used by anybody if they have any ideas on it.

MR. STEIN: Right. By the way, I should emphasize this, and I am glad you brought it up. The Federal law makes it clear flow augmentation is no substitute for treatment at the source.

Thank you, Mr. Kachic.

MR. KACHIC: Thank you.

MR. STEIN: At this point we would like to call on the assistant to Senator Robert Kennedy, Mr. Carter Burden, who has a statement for the Senator.

Mr. Burden.

STATEMENT OF THE HONORABLE ROBERT F. KENNEDY, UNITED STATES SENATOR FROM THE STATE OF NEW YORK, PRESENTED BY CARTER BURDEN, ASSISTANT TO SENATOR KENNEDY

MR. BURDEN: Mr. Stein and Members of the Conference:

Senator Kennedy greatly regrets his inability to be here. He had to be in Washington for the debate on the Dodd case, being taken up this morning on the Senate Floor, and it is necessary for him to be there.

I regret his inability to be here even more.

I have been delegated to read his statement. I am not particularly experienced at this task, as you can see, but insofar as the Senator cannot be here in person, I will read an abbreviated version of his remarks. The full text of the statement will be released for the press and will be available to anyone here who would like a copy.

MR. STEIN: Do you want the full statement to appear in the record as if read?

MR. BURDEN: I think so; yes.

MR. STEIN: Without objection, that will be done.

MR. BURDEN: During the latter part of March, a giant-sized oil tanker named the Torrey Canyon ran aground and broke up on Seven Stones Reef off southern England.

Despite the effort of the Royal Air Force to burn the oil coming from the hulk, a large part of the 118,000 tons of crude oil fouled the beaches and coastlines of southern England.

Thousands of English citizens voluntarily assisted in removing this oil from the beaches and from sea birds.

This pollution diseaster was the focus of attention in the Western World for several weeks, because of the size of the oil cargo that was loosed on the summer resorts of a nation and because of the rapidity with which it occurred.

And one result of this pollution disaster is a number of legislative proposals designed to ensure that future marine disasters will not foul our beaches with oil or chemicals.

The Torrey Canyon disaster shocks us because we can all visualize the damage done by the black tide of oil suddenly washing up on ocean beaches.

Yet, when an equally disgusting tide of sewage and industrial wastes daily washes up on the ocean beaches serving metropolitan New York and New Jersey, we either disguise or ignore this fact.

The pollution of New York's beaches on Staten Island and Coney Island and of New Jersey's beaches along Raritan Bay, has apparently occurred for so long that we find almost no public reaction to this problem.

CONTAMINATION OF BEACHES:

The list of beaches on Staten Island and Raritan Bay that have been declared closed is a long one: Tottenville Beach, South Beach, Graham Beach, and Oakwood Beach are only a few.

South Beach, for example, is operated by the City Park Department, and is banned for swimming by the City Health Department.

And the beaches at Wolfes Pond Park and Great Kills Park, both declared fit for use by the City Health Department, are out of bounds for all United States Army personnel because of the high bacteria count in these waters.

New York City is willing to tolerate a greater chance of infection than the United States Army.

But even if the higher levels of bacteria permitted by the City Health Department cause problems at Coney Island where in the past, I am informed, their officials repeated tests until a satisfactory sample was obtained.

There is no excuse for public health service that ignores a significant danger to our health. Similar records of pollution can also be found at Keansburg Atlantic Highlands, and other beaches on the New Jersey side of Raritan Bay.

DAMAGE TO SHELLFISH AND MARINE LIFE:

Municipal sewage and industrial wastes in the waters surrounding Staten Island and bordering New Jersey and New York cause other damage.

Almost all of the shellfish beds off Staten Island and New Jersey have been closed to harvesters by the action of New York and New Jersey State agencies.

This has resulted in the loss of a crop valued at $500,000 each year.

Bacteria in untreated wastes makes this shellfish unsafe to eat and chemical wastes add unpleasant tastes to the shellfish.

Heavy pollution in the coastal waters also destroys the marine organisms on which sport and commercial fish feed.

Loss of these fish deprives some of a livelihood; some of sport opportunities.

The Arthur Kill, feeding into Raritan Bay, may well be the most polluted waterway in the World.

For in some stretches of this channel, no marine organisms can be found.

Oxygen absorbing pollution and a poisonous chemical kill even the most primitive form of life, the fledgeworm.

Municipal sewage and industrial wastes also exact a heavy toll from the pleasure boaters in the area.

Foul odors make it unpleasant to boat in many of the waters surrounding Staten Island, and chemicals and dirt raise the cost of upkeep enormously -- an increased number of paintings, ruined sales, and continued cleaning are the price of urban filth.

PRICELESS RECREATIONAL RESOURCES:

But although I have the details of some of the damage done in economic terms, by far the greatest damage is done to our recreational resources on the shores of Staten

Island and Raritan Bay.

For our seashore is a valuable heritage which cannot and must not be cast aside as if it were a product with built-in obsolescence.

The ocean wave laughing at a child's feet, the short, darty flight of the sandpiper, are irreplaceable and worth every effort to save.

The Verrazzano Bridge and modern highways have opened up Staten Island, the fifth Borough of New York, to those who have never had the opportunity to use its beaches or sections of the Jersey coast.

Yet, this coastline is just as important to the citizens of New York and New Jersey as Cape Cod to the citizens of Massachusetts or the Oregon Dunes are to the Oregonians.

And there is no reason why the beaches of New York and New Jersey cannot be equally protected.

SOURCES OF POLLUTION:

Fortunately, the causes of pollution in these waters are known.

By far the largest source of pollution is the untreated or inadequately treated human waste from more than five million people which is continually pouring into the Upper Harbor, the Arthur Kill, the Raritan River, and Raritan Bay.

This tide of filth even overwhelms the Atlantic Ocean, for its germs are still present when the waves wash up on the shore of Staten Island and Coney Island.

The list of cities, towns and suburbs contributing this to this pollution disaster -- and it can only be called a disaster -- is shown in the report prepared for this conference.

Lower Manhattan, the Passaic River Valley, much of Staten Island, the Raritan Lower Valley, to name only a few, all follow the beautifully destructive practice of dumping their sewage into nearby waterways.

This may have been acceptable at the turn of the century, when the total population was smaller -- it is not acceptable today.

The second major source of contamination is the larger volume of industrial waste unceremoniously discharged into the Arthur Kill, the Raritan River, the Upper Harbor, and Raritan Bay itself.

All too often industry has treated these bays and rivers as their own private preserve, with no thought to toxic effect of chemicals, oil discharges, and industrial wastes, on these waterways or nearby beaches.

And again action that might have been acceptable on the part of one industry soon becomes viciously destructive when practiced by many.

The list of industrial polluters in the Raritan Bay area is almost a Who's Who of American Business.

Union Carbide Corporation, General Aniline and Film Corporation, American Cyanamid Company, Hess Oil & Chemical Company -- to name only a few -- have all been issued formal pollution abatement orders by the New Jersey Department of Health, and to a large extent those have not complied with these abatement orders.

All these same firms, by and large, have not complied with these abatement orders.

It is no wonder that in 1967 no marine flights can exist in the waters of the Arthur Kill and that the beaches of Raritan Bay and Staten Island are tainted with the smell of chemicals.

MUNICIPAL AND INDUSTRIAL POLLUTION ABATEMENT:

The purpose of this conference, as I understand, is to set the timetable for the elimination of heavy pollution in the waters of Raritan Bay.

It is anticipated that the beaches bordering Raritan Bay can all be used with safety when we complete the pollution abatement program recommended today.

First and foremost, the conference recommends that municipal sewage be given secondary treatment to remove 90 percent of the harmful material.

Lower degrees of treatment, primary treatment that removes only 45 percent, or intermediate treatment that removes only 65 percent, are not acceptable in an area with a population running in the millions.

Primary treatment of the wastes of five million people that live near Raritan Bay would leave the equivalent of the raw sewage of 2,250,000 people, slightly less than the population of Los Angeles.

Only effective secondary treatment can reduce this pollution threat to reasonable limits.

The conference has also established a schedule for the construction of treatment facilities designed to accomplish this goal.

This schedule requires every municipality to give this level of treatment by June 1, 1970, and this requirement applies equally to lower Manhattan, which is constructing a system to carry sewage from lower Manhattan to the plant being constructed at Newton Creek in Brooklyn and to the Passaic Valley Sewer Commission, which will have to undertake a major construction project.

Similarly, the conference recommends that industrial plants on these waterways provide the necessary facilities to remove acids and alkalis, oil and tarry substances, toxic materials, heat, chemicals and other materials that are now discharged into these waters.

This abatement must also be completed by June 1, 1970, except for those companies that have already received abatement orders who are required to comply by the dates specified.

The conference has also recommended that regulations in both States be extended to receive waste treatment facilities for holding tanks in all ships and recreational boats using the area.

This is a necessary step in view of the heavy ship and boat traffic area.

FEDERAL ASSISTANCE:

The Federal Water Pollution Act of 1966 will help the communities of New York and New Jersey to meet the costs of this ambitious and urgently needed pollution control program.

This Act, passed last year, can provide up to 55 percent of the funds required to construct or improve municipal sewage treatment plants and interceptor sewers.

A total of six billion dollars in Federal funds was authorized for a program covering the next five years, and limitations on the size of individual grants that effectively excluded the cities from the program, have now been removed.

This assistance should make it possible for every community to meet its obligations under this program.

I do, however, have one concern about the Federal assistance program, and that is the question of Federal appropriations for this year.

The program as authorized would provide $450 million for 1967.

Yet, the Executive budget contained a request for only $200 million.

I think it would be a great mistake to short-change our water pollution program by appropriating less than half of the funds authorized.

Fortunately, Congressman Blatnik of the House Public Works Committee held hearings on this problem and developed testimony showing that inadequate funds would get the water pollution programs under way.

I have urged, and continue to urge, the House and the Senate Appropriations Committees to appropriate the funds that will muscle into our resolve to clean up water pollution. After all, dollars and not words, build sewage treatment plants.

STATE ASSISTANCE:

In addition to Federal financial aid, New York State also provides grants covering 30 percent of the cost of facility construction under the Clean Water Program.

As a result, New York State communities can receive up to 85 percent of the costs of pollution facilities.

This materially reduces the tax burden on our hard-pressed urban centers, where a single sewage treatment plant may cost more than $100 million. There is no excuse, therefore, for permitting the continued pollution of our waterways.

FEDERAL-STATE-LOCAL CORPORATION:

This conference was called because Raritan Bay is an interstate waterway.

We found from past experience

that the efforts of one community might be wasted if every community bordering the waterway did not enforce similar standards.

And we found that differences in the degree and effectiveness of enforcement of water pollution in different States made it necessary to adopt a single set of standards for an interstate waterway.

This conference has now recommended a common set of standards for pollution control in Raritan Bay.

And the conference has recommended that these standards be met by June 1, 1970. I urge that these recommendations be adopted by the conference and that sanctions be applied to those communities or companies that fail to meet this schedule.

CONCLUSION:

The New York State-wide comprehensive outdoor recreation plan indicates that we will spend over fifteen million in improving Kill's Park, Lemon Creek Park, Coney Island and Drier-Offerman Park, each one a park or beach bordering Staten Island or New York's lower harbor.

These plans are designed to open up and improve these recreation areas.

But the value of these ocean-front parks and beaches is far greater than these figures indicate.

For although there are dozens of parks in New York, these are the only windows on the ocean for thousands of people living in New York City.

The Brighton Express subway or transit busses now give those who live in our ghettos an opportunity to swim, enjoy and feel the sea breeze on their faces.

These beaches and parks, however, are threatened by water pollution.

Already some are closed and others have been damaged by sewage and industrial wastes washing upon their shores.

We have our own tide of pollution as damaging as the one pouring from the Torrey Canyon.

And we can do something about it.

We can demand that the standards recommended by this conference be adopted and enforced.

We should demand nothing less.

Thank you.

MR. STEIN: Thank you, Mr. Burden.

Are there any comments or questions?

(No response.)

MR. STEIN: I wish you would convey our thanks and my thanks to Senator Kennedy, and tell him I am sorry we could not meet him today.

As usual, the Senator has done his homework in a painstaking manner and has come up with his perceptive analysis in dealing with specifics, rather than glittering generalities. We appreciate the contribution.

Thank you very much.

Are there any others here?

(No response.)

MR. STEIN: If not, let us proceed with New York.

Mr. Hennigan?

STATEMENT OF ROBERT D. HENNIGAN, CONFEREE
AND ASSISTANT COMMISSIONER, DIVISION OF
PURE WATER, NEW YORK STATE DEPARTMENT OF
HEALTH, ALBANY, NEW YORK

MR. HENNIGAN: Mr. Stein, Fellow Conferees and Ladies and Gentlemen:

One thing that has impressed me is that since the 1963 meeting of this particular conference, there have been vast changes that have taken place, both on a national and State level, in reference to public attitude and official posture concerning the water quality management and pollution abatement.

To name a few, of course we had the New York State Pure Waters Program, which I think everybody here is somewhat familiar with, which was developed and passed in 1965. At the Federal level we had the Water Quality Act of 1965, the Clean Stream Restoration Act in 1966, and the latest being the reorganization of the Federal Water Pollution Control Administration and its move from the Department of Health, Education, and Welfare to the Department of the Interior.

I think all of this is but a reflection of public expectation and demand for effective environmental control.

I would note that in the past, this public demand or public voice has been just about mute on this question, except for a few people who tried to lead the way and to enlighten the public to the dangers and threat of pollution of our environment.

But I think there is a whole new context that we can view this situation in that did not exist either in 1961 or in 1963.

Another thing that is evident is the necessity for a Federal-State-local partnership -- and I mean a real partnership -- in which the assets of each are maximized, and the liabilities are minimized, all working with a single objective of improving the environment and abating pollution.

I tried to think of some ideas of what the roles of the Federal, State and local people were in such a program. Mr. Stein has alluded to this in some of his remarks this morning.

On the Federal level, I think the need, which is being met now for a national policy of assistance which requires uniform standards and requirements adapted to local conditions across the country, is both needed and essential to any effective program. We cannot have islands of refuge in the United States for people to flee to if there is a great variety of enforcement programs or a great variety of different standards.

Also, the Federal establishment can bring to bear and assist State and local people with technical resources and financial resources which may not be available, and, of course, the Federal Government must exercise leadership in interstate and international problems, which are frequently outside of the area of capability of State government.

The States themselves occupy a more increasingly tough regulatory posture. For many State agencies, this is quite a change from an educational posture to a regulatory posture. This requires effective programming and administration. It requires certain tools, such as incentives, enforcements, surveillance and research.

On the local level, as mentioned by Mr. Adams, the municipalities and the authorities are the action agencies. This is where the issues are usually joined, and much of the success will depend on the ability of these local agencies to come through. They must raise the funds to construct and operate the facilities, which sounds easy, but it usually is not.

We also have our shared responsibilities, because these lines of division I have mentioned are not sharp and distinct, but they are blurred and overlap.

The only point I am trying to make is that, as exemplified by this meeting, it requires the complementary action of these levels of government. The other point is that this combined effort is essential if we are ever going to be very successful.

This New York State Pure Waters Program was enacted in 1965. It provides the three elements of incentive in the form of construction grants, operation and maintenance grants, study grants, and incentive of industry. It has a strong enforcement program based on the fact that we cannot proceed just on a cooperative approach, but we must establish a legal foundation for action if we fail, or if the polluter fails to comply with the orders of the Commissioner of Health, and a surveillance and research program in order to measure what we are doing, and also to try to find some answers to questions that we are not so sure of.

In line with the enforcement phase of the program, roughly 293 orders have been issued by the State Commissioner of Health since September of 1965.

On the construction grant phase of the program, some $49 million of State funds have been committed for the construction of the needed treatment facilities.

Further legislation was enacted. One was a Marine Pollution Control Bill, which sets up standards for the discharge of wastes from boats and marinas, and also controls littering from boats and beaches. This is effective July 1, 1968, and rules and regulations are now being developed.

Another bill that was passed in the 1966 session of the State legislature was the Registration of Outlets Statute. This statute requires that all owners of outlets, industries and municipalities, file with the State Commissioner of Health information on the strength and the volume of the waste discharged into any of the waters of the State in accordance with rules and regulations enacted by him, and in accordance with a schedule established by him. The rules and regulations have been adopted and promulgated.

The key in this particular statute is the requirement that if anybody fails to furnish this information as required by the rules and regulations to the Commissioner, any permits that they hold are null and void.

In the 1967 session of the legislature, the Pure Waters Authority Act was passed. This Act provided a device in State government in which a State agency can act as an agent for local municipalities, or can actually build and construct facilities by contracting with local municipalities. This new element of the program has not as yet been activated.

The Raritan conference is one of four in which New York State has taken part. We have taken part in the Moriches Bay conference, the Lake Erie conference and the Hudson River conference. I sometimes find it difficult to keep focusing down into a certain area, when practically everything we do is so interrelated and all actions we take in terms of the program must have application in New York on a State-wide basis.

The Raritan conference is a rather unique one, unique from two or three points of view. One is that it is the oldest.

Secondly, as far as the States are concerned, we are dealing with a single entity, because all the area in the Raritan conference area is within a single municipality, the City of New York.

The City of New York has cooperated with the State. We have a stipulated agreement, which is equivalent to a Commissioner's order, to proceed with necessary works on an agreed upon schedule. Other speakers from the city will develop this subject a little more.

Getting down to some of the specifics, some of the dates in Volume 1, on Pages 33 and 34, do not coincide actually with our abatement order on the city.

These include completion dates of the Port Richmond West Branch interceptor set at March 1969; the East Branch interceptor at March 1972; the treatment plant expansion, December 1970; the Oakwood Beach south shore interceptor dated December 1970; and the plant expansion is set for completion in December of 1971.

These dates are incorporated in the stipulated agreement with the City of New York. They reflect the city's revised plan for consolidated treatment, and a few large well planned and operated treatment plants serving all of Staten Island, rather than providing a multiplicity of smaller facilities.

It seems that there have been two or three -- five, to be exact -- areas in which there may be some difference of opinion. One relates to the percent removal objective; one in scheduling, which I have detailed in reference to the City of New York; the question of money available for constructing these facilities; some standard differences in the conference area between the Interstate Sanitation Commission, the State of New Jersey and the State of New York; and then some question relative to the possibility of shellfish rehabilitation, the rehabilitation of certain areas for shellfish production in the conference area.

We have one speaker who will be on later, who will address himself to the shellfish business, and he is a well recognized expert on it.

I think, however, there is a single objective to which everybody here agrees, and that is the abatement of this pollution in the area as soon as feasible.

There are some small areas of disagreement, but I think they are rather a matter of evidence than substance, to be honest with you.

I think the foundation of the conference, which I consider the report prepared by the Federal Water

Pollution Control Administration, is probably more substantial than in any other conference I have ever participated in. I think that the recommendations made form an agenda for the executive session which will follow the open meeting.

I agree with the Chairman that I don't see any barriers to coming up with a program which will be acceptable to everybody here and will meet the objectives that we all, in fact, subscribe to.

Shall I proceed?

MR. STEIN: Thank you, unless there are any questions or comments.

(No response.)

MR. STEIN: Will you go ahead, Mr. Hennigan?

MR. HENNIGAN: My first speaker will be Mr. Maurice Feldman, First Deputy Commissioner, Engineering and Research Development, and Deputy General Manager of the Water Pollution Control Division of the New York City Department of Public Works.

Mr. Feldman.

STATEMENT OF MAURICE M. FELDMAN, FIRST DEPUTY COMMISSIONER, ENGINEERING AND RESEARCH DEVELOPMENT, AND DEPUTY GENERAL MANAGER, BUREAU OF WATER POLLUTION CONTROL, NEW YORK CITY DEPARTMENT OF PUBLIC WORKS,

NEW YORK, NEW YORK

MR. FELDMAN: My name is Maurice M. Feldman. The description of my title is correct, so I won't repeat it.

My main function here is not to give you any of the detail matters that New York City is concerned with as a part of New York State and its interest in the Raritan Bay area, but mainly to introduce to you a person who has been living and working with this problem for many years, the Director of our Bureau of Water Pollution Control of the Department of Public Works in New York City, Mr. Martin Lang, who will, I know, give all that we are concerned with and contribute greatly to the value of this conference insofar as it affects New York City's interest.

Mr. Martin Lang.

STATEMENT OF MARTIN LANG, DIRECTOR, BUREAU OF WATER POLLUTION CONTROL, NEW YORK CITY DEPARTMENT OF PUBLIC WORKS, NEW YORK, NEW YORK

MR. LANG: I am Martin Lang, Director of the Bureau of Water Pollution Control. I have only held that position for the past two months, but I have arrayed behind me, invisibly, of course, some very distinguished predecessors, so I speak for them as well as for myself and the Department.

I regret I do not have a prepared address. The net result of that may be that there may be a few participles left dangling, there may be some lack of coherence at times, but maybe on the plus side is this: The distinguished conferees -- perhaps I can hold their span of attention, because they won't have to compete with some document in front of them.

What I propose to do is, first, give you a sort of quick horseback view of the accomplishments of the City of New York in this field, and then go on specifically as to what the future of the program is in New York City. Then specifically as to how that will relate to the Raritan Bay waters.

New York City does not come here as a sort of apologetic suppliant. We don't have to be dragged into the Twentieth Century of water pollution control screaming and kicking. It is not necessary to apply Mr. Stein's carrot and stick, and, Mr. Stein, that's a big stick and a very small carrot.

(Laughter.)

Let's just take a view of New York City. I don't know if all of you can see this. I wouldn't take it amiss if any of you wanted to come up forward and occupy any of the vacant seats and get a better view.

Dr. Kandle, here is the population, or a little more than the population of the entire State of New Jersey (indicating). Here it is compressed into an area of a little less than one-twentieth of the State of New Jersey.

I am going to talk about 80 years of a concerted approach to pollution control in New York City. This is no figure of speech, because in the 1920's, a unique team was assembled in the city to conceive, design and construct the basic pollution control program of the city, and their concepts are now being built to take us to the year 2000 and beyond, so this eighty years is not a figure of speech.

Here we have the sprawling megalopolis, and here are the receiving waters, a salt water estuarine system, a very complex estuarine system.

It has been intensively studied, but just to cite one thing, the East River, for example, the inner waterway of the city -- we refer to it as the "East River," but obviously it is a misnomer because the East River is a tidal strait, and to this date all the hydrologists, Army Engineers, Federal agencies, are in some dispute as to whether there is a net flow from the Long Island Sound to the Upper Bay, or from the Upper Bay to the Long Island Sound.

There are very complex movements in here. For example, even you native New Yorkers may be surprised to know that when there is ebb tide the Harlem River ebbs up to the Hudson and not down to the bay.

But there is one thing everybody agrees on: This is a pretty good mixer, this Upper Bay. Another thing everybody can agree on is this: That these waters don't recognize geography, politics and political boundaries. The waters don't know the sources of the pollution; they just respond to them, whether it is New York City or our neighbors across the river.

Incidentally, let me state right here and now, we are not taking the position that there is any antagonism or divergence between New York and New Jersey.

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We believe we are now and will be increasingly partners in the intelligent management of these joint waters.

In the early 1900's, a group of engineers in New York City began to foresee what was happening in the degradation of the waters which had made New York City great, and a plan began to crystallize.

In the 1920's, specific action was taken by the city. A group, probably unrivaled in the history of this country, was assembled of sanitary engineers, electrical engineers, mechanical, civil, and structural engineers, who began the design of the basic program, with a very specific object of treating all the dry weather waste water within the City of New York.

This program has plowed ahead, slowed by the depression, temporarily stopped by the wars, temporarily deterred by shortages of material, manpower and money, and now given a new boost of acceleration by State aid. Nevertheless, it has never stopped, but moved ahead.

Let's just see what happened.

All these brightly colored patches (indicating) are individual drainage areas. In 1935, to protect the biggest bathing beach in the world, the Coney Island plant went on stream. This -- of course, it is a pejorative word, Mr. Stein -- was a primary treatment plant, enhanced, however, seasonally during the bathing season by chemical coagulation. We used chlorinated ferrous sulfate to create a ferric chloride floc to enhance the removals during the bathing season, and, of course, the effluents were subject to chlorine disinfection during the bathing season.

But, even then, the engineers realized they were tuned to the tenor of the next generation, the thinking of the next generation. In 1937, the Ward's Island plant for complete activated sludge treatment went on stream. An immediate result was an uplifting of the dissolved oxygen which had entered the most degraded waterway of the city, the Harlem River.

In close succession, in time for the World's Fair, the Bowery Bay plant, 40 MGD, and the Torman Island plant of about the same capacity, went on stream in the upper East River.

The war came along. We had already started, and then pushed the completion in the first years of the war of the Jamaica plant on Jamaica Bay. All of these plants provided secondary treatment.

Mr. Stein, in the 1930's, New York was convinced of secondary treatment, and very significantly they were doing this -- at what time? At a time when throughout the country at best only primary treatment was normally being employed, at a time when even in our own State, and certainly in the Midwest major cities, unpotable watersheds were discharging either raw sewage or only sewages subject to plain sedimentation.

In short, this elite group of designers and conceivers were already attuned to the thinking of the 1970's.

Incidentally, I might add that the city was fortunate in getting and holding on to these men, by virtue of one regrettable phenomenon, the depression.

At the conclusion of World War II, the pent up backlog, the designs, the concepts already prepared, emerged in full strength. Within a period of a comparatively few years, a period of four or five years, the Owl's Head plant on the Narrows, embodying secondary treatment with a capacity of 160 MGD, went on stream, in February 1952.

Within a few months thereafter, the Hunt's Point plant, about 110 MGD, went on stream in the Bronx; the Rockaway plant, 15 MGD, in Rockaway; and a few years thereafter, two plants in Staten Island, the Oakwood Beach, secondary treatment, and the Port Richmond plant, primary treatment.

Now, remember this little plant here (indicating), 10 MGD, was primary treatment. This was even then conceived as an interim measure, because to go anywhere beyond that, considering the loads on the Arthur Kill, considering the industrial waste in the Linden-Roselle complex, would be, to quote Shakespeare, to "paint the lily" or "gild the finest gold" anywhere, but again it was conceived as an interim measure, hoping we would make one small movement forward and others would follow suit.

Now, another phenomenon supervened that you are all familiar with, the tremendous shift away from the heartland of the city out to the periphery of the city, and even while we were planning the remaining plants to pick up all the dry weather waste water, we had to go back and expand the outlying plants.

To cite one specific instance, the Rockaway plant went on stream in 1952, with a capacity of 15 MGD, deemed adequate for thirty or forty years. This unexpected population shift compelled us to go back, redesign and double the capacity of the plant by 1962.

The capacity of the Bowery Bay plant was tripled in the 1960's. The capacity of the Torman Island plant was substantially increased. The capacity of the Jamaica plant was increased, not to mention the 26th Ward plant, which also went on stream here in 1950.

Now, all these plants are secondary treatment, and all these plants were built with the City of New York's taxpayers' own money. They put their money where their convictions were.

This was long before any purported cornucopia opened up in Albany, or a smaller cornucopia in Washington (laughter), and the basic program continued.

While these plants were being expanded, the Newtown Creek plant was being designed and constructed. The North River plant was being designed.

Now, you notice something unusual here (indicating). Here is the Newtown Creek plant in Brooklyn. It is one of our big plants, 310 MGD, and, Mr. Stein, I would like to respectfully call to your attention that for plants of this magnitude, some substantial lead time is required between concept and treatment, that these timetables must be realistically predicated on the fact that our bitter experience shows that between the time the decision is made and the plant actually receives sewage, some five to seven years may elapse.

Those of you who are native New Yorkers know the situation along the waterfront. Thank goodness, this dedicated group in the early 1930's acquired sites, because this is the problem. In order to treat the sewage from 72nd Street down south to the Battery and around to Bank

Street, a deep rock tunnel was constructed under the East River, and the sewage is being conducted for treatment in the Newtown Creek plant in Brooklyn.

In order to construct the North River plant, a site is being designed, some of which is being built, the site itself at the cost of a million dollars an acre on a platform, because massive sites cannot be assembled within the political boundaries of New York City now.

Fortunately, however, as we have an excellent group of designers, the City of New York also was privileged to assemble a group of sanitary engineers who made the major contributions to the art of sewage treatment in the world, in a small group of dedicated individuals doing this in addition to their other duties, working out of the Ward's Island plant.

Incidentally, Commissioner Feldman is an alumnus of that group.

Processes, such as step aeration, activated sludge aeration, short-period aeration, high-rate digestion, digested sludge recirculation, and many others -- incidentally, I have a bibliography here with 150 items -- were developed.

These are not esoteric ivy tower academic studies; these are real hard contributions which are being applied within New York City and elsewhere throughout the world.

I might point out, for example, the chief of the Division of Plant Operations here is the only man in the United States who was the three-times winner of the Gascoyne Award for the outstanding contributions to the art of sanitary engineering.

At this very moment, while we are standing here, the State Federation is meeting today in Rochester. Out of all the papers submitted by engineers in New York State, three were selected for honors. Two of those are from New York City, and these again were not for any esoteric projects. One was for a major contribution by two men of the Department, one since retired, Torpy and Melbinger, for a process whereby the net volume of sludge to be disposed of could be effectively reduced even after digestion.

I have a lot of documentation here, but don't let that overawe you, because this documentation plus a pocket slide rule substitutes, you know, for a thumb and blanket for the engineer.

New York City, for example, pioneered in the abandonment of the use of compressed liquid chlorine for the disinfection of effluents, and took the courageous and more expensive step several years ago of completing converting

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to the use of sodium hypochlorite to protect these people in this compressed metropolis against any disaster from leaking chlorine.

These are the two papers which are being honored today. I won't read you the other 150 items in the bibliography.

Among these contributions was a process for achieving full activated sludge results, 90-plus removal in a limited volume, the so-called Gould step aeration process, now virtually standard throughout the country.

Mr. Gould, a distinguished former director, Director Emeritus, retired now, has made this contribution to the entire world, and this enabled us on even limited sites to give 90-plus removal.

We did one other thing. We developed intermediate degrees of biological removal for this period between the 1930's and the 1970's, when the State's standards would be such that it would be going far beyond the then requirements to give 90-plus removal, and we used some intermediate degrees of treatment.

We devised a modified aeration and short-period aeration, which gave very economical and effective treatment, far beyond double that of primary removal, a little short of that of complete step aeration, and effected great economies in plant operation.

Now, where do we go from here?

New York City made firm commitments to the State of New York to complete its basic dry weather wastewater program by 1972, and it proposed to do it in the following manner:

Put the Newtown Creek on stream. This will be done within a couple of weeks. The plant is built, it is there, and the equipment is installed. We are now at the stage that many of you practical engineers know, where it is 99 percent complete, and we want to get that last one percent done. It is 99.9, as a matter of fact.

We propose to build the North River plant to take care of the remaining raw wastewater discharges into the Hudson.

We have already started construction on one leg of the interceptor. We propose to build, within that period of time, the Red Hook plant for step aeration on the East River and Upper Harbor.

We propose to expand the two Staten Island plants, convert the Port Richmond plant from 10 MGD to 60 MGD, and convert it from primary treatment, in one giant step forward, to complete secondary treatment.

We propose to expand the Oakwood Beach plant from 15 MGD to 30 MGD and provide complete secondary treatment there. When that is done, we will have virtually completed our basic program.

In these blank areas in Staten Island, pending the growth of population, there is an interim measure we are considering, because we have a healthy respect for a buck, using a combination of pumping stations and force mains to convey the relatively small drainage areas to the major plants, and we like this because we pride ourselves on our process control in the plants.

New York City has a unique program. We have an elite group of sanitary engineers going around to all these plants controlling the process. That decision remains in the hands of professional engineers.

Let's put some figures on this. The plants already built and in operation with the sites, the 60-odd miles of interceptors and the plants, have a reproduction value of about three-quarters of a billion dollars. The remainder of the construction for which hard commitments have been made is in the order of $370 million, and, regrettably, you engineers know how that has a way of escalating sometimes.

At this moment, the New York City wastewater flow, which is essentially the used water supply of the city, runs about between 1.2 or 1.3 billion gallons per day, depending on the degree of water conservation. We are now treating 800 million gallons per day, two-thirds of the wastewater.

The degree of treatment we are giving varies somewhat from plant to plant, because some plants are used to their full capabilities only seasonally. However, that will change and we propose to apply them all year round.

But at this time we are getting 70 percent BOD removal of all the wastewater being treated. Of all the wastewater of New York City, raw as well as treated, some 50 percent will be removed.

We have made some close projections as to what our ultimate degree of removal will be when we complete this program as outlined, and that degree of removal will be 80 percent BOD removal.

However, as I pointed out, New York City is not static in our thinking. We are attuned to this fluid technology of sanitary engineering, and we expect to exploit new techniques as others devise them, or as we devise them ourselves.

Therefore, we propose to get under way a program, which we have already made a beginning on, to seek improvements in those plants where less than full-step aeration results are now being achieved. We propose to begin feasibility studies of taking those major plants which have the site capabilities, because ground is precious, to see what can be done to convert and upgrade Coney Island and Owl's Head to possibly full-step aeration.

So, I have outlined two steps: Complete the basic program; start a new wave of upgrading; but there is a third program in the City of New York.

If each of you, as many are, were taxpayers in the city and you said, "I put my tax dollars into this program; I put it in long before the State and Federal aid; What am I going to get?" "Well," you say, "I have abated the nuisances in the waters." "Fine. Then should I put any more money in it?"

Already, ten years ago, the city began thinking along those lines, and in 1957 we began assembling preliminary reports on another very bright and worthwhile objective. We knew the intrinsic problem of combined sewers and 80 percent of New York City has combined sewerage.

We have ringed, for example, Jamaica Bay, this beautifully sheltered body of water (indicating) to give effective secondary treatment. Could we bathe there? The answer is no, because during storm periods there would be release of combined storm flow and wastewater into the receiving waters here.

At that time the solution seemed simple -- a very simplistic view of it. If we will take care of the stormwater overflows, then we will go into the millennium and we will have achieved our result. And the City of New York proceeded to design stormwater plants.

Incidentally, the semantics of this field keep changing. When I was in it, it was "sewage disposal"; it is now "water pollution control." It is not "stormwater plants." It is "auxiliary pollution control plants."

The objective of these plants will be to retain half the storms and, in any case where combined stormwater and wastewater would overflow these plants, those flows will be subject to desludging, degritting, and effective disinfection by hyperchlorination.

However, New York City is unique in one other respect. We have had a harbor survey going and we have had hard data which shows us all the parameters in this harbor as far back as 1909.

Close scrutiny of this showed something unique. Something has changed in the marine environment in the United States in the last fifteen years, perhaps with the substitution of synthetic detergents for conventional soaps.

M. Lang

After all, when a housewife buys a box of some synthetic detergent, she buys a pound box, and she buys about three-quarters of a pound of phosphates, hexametric phosphates, trisodium phosphates, and the outpouring of these new nutrients in these waters may have changed something, because we saw certain phenomena there.

Again, without recourse to the Federal Government, the City of New York spent $50,000 of its own money to have the faculty at New York University make an elaborate computer study, which verified our findings that there was some unique phenomenon in coliform growth in the harbor, and, nevertheless, we felt that the goal, for the first time, of creating beautiful new bathing beaches in the heart of a megalopolitan sprawl was so worthwhile, that we have proceeded on all fronts.

We already have the Spring Creek plant designed, contract specifications prepared; it has passed the State, and it is in the hands of the Federal Government now, and we are prepared to go to contract this year to build the first prototype.

At the same time, we have consulted with the Federal agencies to get together for a unique city, State and Federal joint in depth scientific study of all the phenomena associated with the creation of bathing beaches in Jamaica Bay, and this study, of course, is not only of significance to New York City; it is of national value, which is why the Federal Government is interested in it.

Incidentally, this again is no idle speculation. We expect to get this off the ground this summer. I was in Washington on this as late as last Friday. We expect to have firm commitments within weeks on this.

This auxiliary program envisages ringing the better potential bathing waters of the city, like Jamaica Bay and the upper East River, Eastchester Bay, Little Neck Bay, the Clearview area, with over 20 of these auxiliary pollution control plants, at a cost of again some $360 million.

So, gentlemen, I have outlined three basic programs of the city: First, the program which is in progress now and is moving toward fruition, to take care of all the dry weather wastewater and afford it a degree of secondary removal, which will provide a minimum of 80 percent removal city-wide -- in some plants, this may be well beyond that, in some plants below; but if you regard New York City as an entity, it will be above 80 percent.

The other program then will not go concurrently with that, but after that, because we have made a commitment to finish this in the early 1970's.

M. Lang

Then, after that, we will start this program of feasibility studies to upgrade these major plants in these important waterways, plus a concerted program to enhance the so-called modified aeration plants, so that we can look forward by the 1990's to get beyond 80% BOD removal, and, concurrently with this program build the prototype of the Spring Creek plant, combine that with an in depth scientific study, and give us the meaningful answers, which will give us the green light to go ahead and get new bathing beaches in the city out of the conversational stage, out of the glossy brochure stage, and into actual being.

As evidence of the City of New York's firm intent to proceed along these lines at long last, the city administration has made a hard-nosed confrontation with the problem of unsewered areas in Broad Channel. Those of us who read the newspapers in New York City know about the local reaction, but the move has been started.

Now, how do you propose to do this?

Mr. Stein, you are an attorney. You said, "You engineers will worry about the nuts and bolts aspect." Some of my colleagues here are a little more -- actually, how do you do this?

We had the gentleman from New Jersey say he was going to solve the problem by trying to raid Paul DeFalco's staff. Bob Hennigan is solving his personal problems by raiding New York City. For us, we are low man on the totem pole.

I don't like to contradict Senator Kennedy. That might be awfully presumptuous of me, but his emissary said, "You build the plants with dollars."

He is wrong. You design and construct them with men, with talented men. As I said, this field is unique, in that it requires a blend of all the engineering discipline to make an effective plant and to continue effective operation.

This is the problem, Mr. Stein, how to retain the talent we have, and how to assemble a new array of talent.

You see, someone may say, "It's very simple. You will hire consultants." But we have found we do employ consultants. We are trying to optimize all our resources, because again we must have top-flight project engineers working with these consultants to ensure an effective program.

The sad roster in New York City is this: The former director, initiator of this giant program, Mr. Gould, retired, and is actively working as a consultant. Mr.

O'Leary, his predecessor, retired. Mr. Steffensen, my predecessor, retired now, is probably doing consultant work. Bill Torpy, one of the most unique engineers we ever had in the city, who gave us the impetus for many of these new concepts, retired.

People don't know about it, but we have here in the audience probably the most outstanding design engineer in the country on these projects, and that is Lou Schwartz, Chief of our Design Section, and Lou said this may be his last year.

This is the shape of the future. This is the problem. You need men. The dollars perhaps we can get, but the men you need to execute this program.

So, therefore, in assembling your timetables, I beg of you, you conferees, let the sweet light of reason prevail (laughter).

Now, I think I have violated all the concepts of what I was taught in the Army Field Manual of M-7 on how to speak, where you say you give -- what is it -- explanation, demonstration, application, instruction and critique, and I guess I have failed along those lines.

But let me try to show you pictorially some of the shape of the future in New York City.

I mentioned that we had a plant built ready to go on stream. This is the Newtown Creek plant in Brooklyn, with a capacity of 310 million gallons per day to treat sewage from Brooklyn, Queens and Manhattan. It combines our best thoughts, and remember, we don't stamp out these plants like cookies with a cookie cutter. Each plant embodies in it our best knowledge and thinking and experience gained from the preceding plants.

Mr. Cunetta, the Project Engineer who is here today, embodied in this a unique concept. Because New York City has a multiplicity of units, we have been able to eliminate a lot of the cumbersome hydraulic structures and have a continuous flow-through tank, a continuous flow-through grit chamber, aeration and finally a sedimentation tank.

Let me backtrack a little. Originally, our plants were designed only on those Class A waters as Tom Glenn promulgated to provide seasonal chlorination. To attune ourselves to the Federal thinking and to anticipate even the requirements of this Raritan Bay conference, there is a change-order on the Newtown Creek plant and we have embodied hyperchlorination facilities.

Remember, I mentioned that we have plants which are now a generation old, like Ward's Island went on stream in 1937. You know what happens in these plants.

They get old. They need rehabilitation, and maybe what was good in the 1930's should be improved in the 1970's.

So again, we are upgrading, expanding and incorporating new concepts in even existing plants.

This (indicating) is the 26th Ward Plant. Here is an existing plant.

Incidentally, you notice we are in the marine business. It is a little known fact that our bureau operates a fleet of four ocean-going sludge vessels.

This plant will incorporate the newest thinking, only devised within the last ten years, of combined sludge thickening to reduce the volume of sludge, to combine the latest techniques in high-rate digestion, and you see the brand-new division here, a chlorine contact chamber, to enhance the bacteriological kill.

Incidentally, Mr. Stein referred to the fact that he was concerned that plants are built, but sometimes do not realize their full potential. I have to account for my stewardship of these plants to a lot of agencies. I have to account to the New York City Department of Health, to the New York State Department of Health, to the Interstate Sanitation Commission, and now, of course, to the Federal Government.

I think we have passed the test, because the

State now scrutinizes and exercises substantial surveillance for any plant that wishes to avail itself of their operation and maintenance subsidy.

I am happy to report that all New York City plants have been deemed eligible for that one-third subsidy.

Incidentally, to give you an idea of the order of magnitude, the basic operating annual expense of these plants, with no capital cost considered, is $14 million a year.

This (indicating) is the Ward's Island plant. This was the plant that was built in the 1930's, without sludge digestion, the only plant in the metropolitan area that is still taking raw sewage to sea, and now we are incorporating all these techniques, full-step aeration, separate sludge thickening, sludge digestion, hyperchlorination. There you see, Mr. Hennigan, the chlorine contact chamber right there (indicating). This design is well under way now.

Now, we spoke of ringing the potential bathing beaches of the city with these auxiliary pollution control plants.

Here (indicating) is the first prototype, the Spring Creek plant, based at the head of a tidal inlet at

Jamaica Bay, designed to be esthetically compatible with the community and to blend in parkland. Within this plant, fully half the storms between May and October will be impounded. The removal on those will be 100 percent, because nothing will overflow. At the conclusion of the storm, the underflow will be degritted, diluted and conveyed back to its mother plant, the 26th Ward plant, and then, largely by gravity and the rest by pumping, the rest will be conveyed after the storm to the plant for step aeration treatment.

This is typical. I just cite this one. There will be many such around the city, but this is the key, because accompanied with the construction of this plant will be an intensive study of the immediate micro-environment of this plant to assess all the factors that are required to make bathing beaches.

For the first time, we hope within the City of New York to assemble a team of microbiologists, marine biologists, to do a concerted approach, to study for the first time the whole biota, the whole marine ecology of these receiving waters.

Well, gentlemen, I think I have imposed on your patience long enough. I just want to sum up by saying one thing.

New York City has a basic program. It has an auxiliary program. It is going to follow the basic program with a further attempt to upgrade existing plants.

The immediate goal to be achieved by the early 1970's will be substantially 80 percent removal over all, higher in some places, a little lower in other places, but the city as an entity will achieve that removal. It will then bind itself to continue to upgrade.

As far as the waters of the Raritan Bay study area are concerned, we feel that the plans already committed for Port Richmond and Oakwood Beach will meet our obligations to the Raritan Bay.

We look forward to the time when our neighbors across the river will give substantially the same degree of treatment, and at that time we can move into a new era.

We are using these new sophisticated techniques of mathematical modern studies, and one indication alone shows that in the Hudson, within New York City, within our own time, we may get the dissolved oxygen back to where it was in the early days of the century.

Thank you for your patience.

MR. STEIN: Thank you, Mr. Lang.

Are there any comments or questions?

(No response.)

MR. STEIN: Thank you for a very comprehensive and articulate statement, Mr. Lang.

You know, in dealing with these engineers for a long time, I always wondered why a rough and tough group like you are called civil engineers (laughter). Now that I hear you use words like "pejorative" and you quote Shakespeare correctly, maybe I will understand (laughter).

Also, you have cleared up a couple of items for me. One thing you pointed out, you said a dedicated group in the early 1930's acquired sites. I wish I had been smart enough in the early 1930's, because I am a New Yorker, to have done the same thing. I don't think I would be sitting here today.

Then, of course, I have always wondered how New York continued to grow with your tremendous population explosion, and you have given me the clew to that too in talking about your elite group of designers and conceivers (laughter).

Thank you.

MR. HENNIGAN: The next speaker will be Mr. David H. Wallace, who is Director of Marine Fisheries for the New York State Conservation Department.

Mr. Wallace.

STATEMENT OF DAVID H. WALLACE, CHIEF, BUREAU OF MARINE FISHERIES, DIVISION OF FISH AND GAME, NEW YORK STATE CONSERVATION DEPARTMENT, OAKDALE, NEW YORK

MR. WALLACE: Mr. Chairman, Conferees, Ladies and Gentlemen:

My name is David H. Wallace. I am Chief of the Bureau of Marine Fisheries for the New York State Conservation Department.

The New York State Conservation Department has a continuing strong and long interest in pollution control in Raritan Bay and Lower Bay. Extensive fish and shellfish resources exist there and wild waterfowl regularly use the area. In the late 19th century, the center of New York's oyster industry was located in Princess Bay, part of the Raritan Bay, and was forced to vacate the area as pollution increased.

Before going into a discussion of the fish and shellfish resources in Raritan Bay, however, I would like to touch upon Item 10 in the recommendations of the Federal Water Pollution Control Administration for Raritan Bay.

D. H. Wallace

This item deals with the shipping channels, or a relocation of the shipping channels in the Raritan Bay and the selection of areas for dredging.

As I am sure everyone here knows, the resources of Raritan Bay in New York waters, including the mineral resources, are the property of the State of New York. The conservation and development of these renewable and non-renewable resources are primarily the responsibility of the Conservation Department, although other State agencies have varying interest in these resources. In 1965, the Legislature of New York passed a law called the Stream Protection Act. This Act became effective January 1, 1966, and designated the State Water Resources Commission to administer the law. One of the primary purposes of the law is to regulate and control the physical changes in the aquatic environment. including dredging for fill materials, filling of wetlands, bulkheading and docks. The waters and wetlands in Raritan Bay come under the provisions of the law, and my office has been designated the local permit agent.

The staff members of the State agencies comprising the Commission within the past year have developed a tentative plan designed to protect the fish and wildlife resources of Raritan Bay and Lower Bay while providing for utilization of the extensive non-renewable mineral resources which exist in the area.

I am presenting here, Mr. Chairman, a map which delineates these various classifications in terms of use of this area which I will submit to the conferees.

MR. STEIN: Without objection, this will appear with your statement in the record.

MR. WALLACE: The map delineates that part of the Bay set aside for dredging of fill materials. The map indicates other areas where dredging is undesirable because of high fish, shellfish or wildlife values, or where dredging might result in increased shore erosion or beach damage. The plan depicted takes into consideration the pollution problems in Lower Bay and Raritan Bay.

Dredging of a straight ship channel across Raritan Bay has been projected to improve water circulation and exchange and, at the same time, to facilitate ship access to industrial sites in Arthur Kill and the Raritan River. It seems to me that this is in line with the recommendations in the report of the Federal Water Pollution Control Administration. As an additional conservation measure, firms granted permits to dredge in a designated preferred dredging area will be required to remove existing shellfish before their mining operation can begin. The permittee will also be required to tie into existing channels of comparable depths to eliminate deep holes in which pollution conditions might be aggravated.

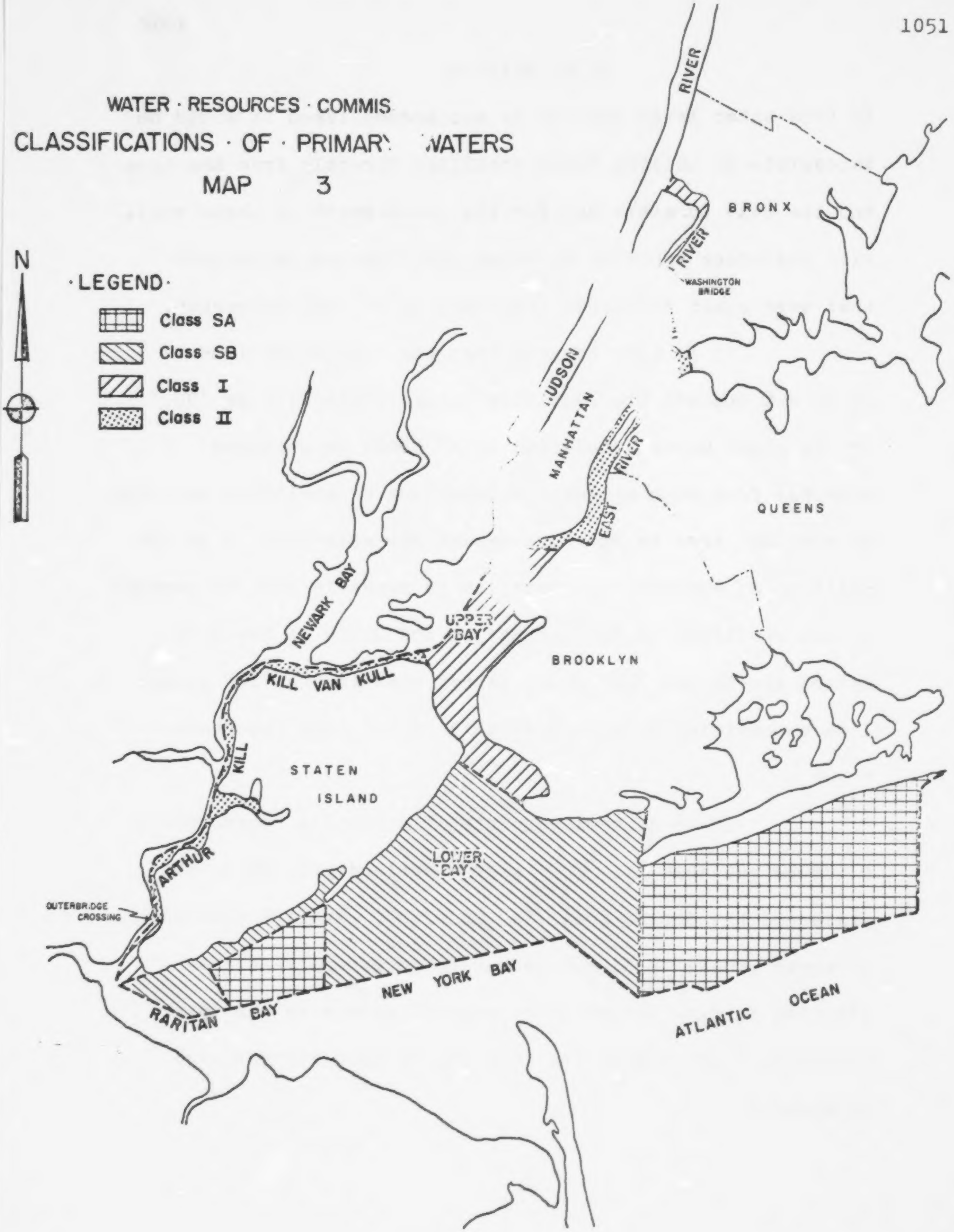
This initial plan will undoubtedly be modified as further studies and experience provide additional information on the extent and potential of the total resources and the needs of the State in utilizing these resources. However, the significance of this original effort cannot be overemphasized. The State of New York has started to plan for the compatible use and development of the renewable and non-renewable resources of Raritan Bay and Lower Bay.

The State plan shown in this exhibit prohibits dredging westerly of Great Kills Boat Channel to prevent the destruction of the extensive beds of shellfish which exist there. The conferees, and all of you, are aware of the large populations of clams which exist. Studies have shown that millions of bushels of clams are present in Raritan Bay in both New York and New Jersey waters. We estimate the total market value of these shellfish at this moment is about $40,000,000. While these shellfish represent a tremendous potential asset, they can only be considered a highly dangerous public hazard now because of the contaminated condition of the waters of the bay.

All of the waters of Raritan Bay within the boundaries of the State of New York are restricted currently for the harvesting of shellfish, and will remain closed until such time as they meet the criteria of the Federal-State-industry cooperative shellfish program, irrespective of the classification. Mr. Van Derwerker pointed out this program yesterday.

In 1961 the "SA" waters shown (Exhibit B) were closed to shellfish harvesting by this agency because of the questionable quality of the overlaying waters. This preventive action, taken in the interest of public health, forced hundreds of people to seek other employment and resulted in an economic loss of $500,000 annually. With the increased value of hard clams since 1961, the annual loss for New York at current prices would be closer to $1,000,000, and here I am speaking specifically of the area classified as "SA" waters" -- not those that exist in the "SB" classification.

Steps 1-9 recommended in the summary of the report of the Federal Water Pollution Control Administration to this conference to abate and control pollution presumably are designed, if carried out as scheduled, to improve the water quality by 1970 in the area "SA" by State water classification up to the level necessary for the direct harvesting of shellfish, although the language in the Summary in Item 12 leaves doubt about this concept.



WATER · RESOURCES · COMMIS

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MAP 3

If this water level quality is not accomplished it would be impossible to utilize these shellfish directly from the area and the only possible way for the development of these shellfish resources would be by using purification techniques that were again mentioned yesterday by Mr. Van Derwerker.

It is also assumed that the recommendations would not upgrade the remaining waters classified as "SB," or, in other words, shellfish still would be utilized directly from such waters. Populations of shellfish existing in the "SB" area in New York waters are extensive -- in the millions of bushels. In fact, it is probable that 75 percent of the shellfish in Raritan Bay in the State of New York waters are in the "SB" group rather than in the "SA" group. I am emphasizing this because this is of grave importance to us.

These contaminated shellfish, while representing a future valuable resource, pose a serious problem to the State and the entire shellfish industry. Massive depletion of these grossly polluted beds through extensive transplanting to pure waters where natural cleansing can take place seems at present the only course open for rational management.

New York initiated such a program in 1966 in Jamaica Bay, which Mr. Lang was talking about just a little while ago, in close cooperation and coordination with authorities of New York City with notable success. A comparable program should be activated by both New York and New Jersey for the waters of Raritan Bay. Poaching of shellfish from these waters is a continuing health threat. A rigid, coordinated enforcement program between New York and New Jersey to prevent such poaching is essential to minimize the public health hazards. It is suggested that the conference assist in bringing this about, and devise plans for helping in the financing in carrying out such programs.

Since one of the original reasons for the Federal action on Raritan Bay in 1961 was the public health threat from shellfish from polluted waters, it seems appropriate for the conferees to explore with the States involved the techniques which would reduce such hazards while the pollution abatement steps are being accomplished.

Fish and wild waterfowl, in contrast to sedentary animals such as clams, have the ability to move from contaminated waters. In many instances the damage from pollution to such organisms is not so directly apparent. However, deterioration of the marine environment, even in such a limited area as Raritan Bay, reduces the capability of fish to maintain themselves at a high level of abundance. The shad, herring and menhaden fishery with fixed gears has disappeared from these waters. In 1966 and 1967, not a single application for licenses of this type was received by our department.

The recreational fishery in the Lower Bay area has also suffered a serious decline in the last three or four years. This party and charter boat fishery in Lower Bay and Raritan Bay has been meeting the recreational needs of hundreds of thousands of people for many years. Environmental deterioration is undoubtedly part of the cause of the drop in abundance of fish. Sport fishing is one way to meet the need of part of our urban population for outdoor recreation in close proximity to the place in which they live. We must keep this need in mind as a major benefit in our efforts to restore our estuarine environment.

Thank you.

MR. STEIN: Thank you, Mr. Wallace.

Are there any comments or questions?

(No response.)

MR. STEIN: This was an excellent statement indeed.

You know, I would like to take this opportunity to point out what I think is a possible alternative to our manpower shortage, to which you referred, Mr. Lang.

I knew Mr. Wallace, as we all have who have worked in this field for many years, when he was down in Maryland. As far as I can see, he is one of the outstanding marine and aquatic biologists in the country. We have a few on our staff too, but they are rather scarce and we did not think it necessary to bring one up here for the conference.

The point is: I think what Mr. Wallace, working for the State, says, is good enough for us, and we accept his analysis. Part of what we are going to have to do in the future with this personnel -- and this is up to the bureaucrats like us -- is forget some of the Federal, State and local conceptualism. If we have a joint problem and one of us has one of these experts on the staff, we must utilize him as if it were an integrated staff.

I know we are trying to do that more and more with the States. I don't see that there is any other way out, because there really are not enough people to go around.

MR. LANG: This was precisely the proposal that we made to Dr. Weinberger of your agency last February, that, if necessary, he actually detail people from the Federal agency to work jointly with us on this project; but, again, everybody gets a little defensive.

MR. STEIN: Well, I don't know that this is the place to discuss this.

Again, when you deal with a word like "detail," then you talk in terms of this administrative conceptualism and we get these blocks. This is what we have to avoid. But I think if we can accept that, that is precisely where the problem comes up.

In a case like this, speaking for us, we couldn't improve and would not presume to improve, after knowing Dave's work through the years, on his analysis of the shellfish question. If they made an analysis in New York with a man of Mr. Wallace's caliber, we would proceed on that.

Thank you very much.

Are there any further participants?

DR. KANDLE: Yes.

MR. STEIN: Dr. Kandle?

DR. KANDLE: Mr. Chairman, we would like to hear from Mr. Frederick Richardson, who is a former mayor of New Brunswick, and a lifetime worker for the cause of clean waters.

STATEMENT OF FREDERICK F. RICHARDSON,
FORMER MAYOR, NEW BRUNSWICK, NEW JERSEY

MR. RICHARDSON: Dr. Kandle and Members at the speaker's table, and Conferees:

My name is Frederick F. Richardson. I live in the City of New Brunswick and my interest in water problems is mainly in the Raritan River, because some 30 years ago, when I was Mayor of the City of New Brunswick, we entered into a three-way agreement with the State Board of Health, with municipalities of our county, Middlesex County, and the industries, that if the municipalities would build their sanitation plants at that time, the State Board of Health assured us that after we had done our duty they would enforce a similar responsibility upon all the industrial plants fronting on the river. That was in 1935.

I am here today because, although I have been out of office since 1943, having served eight years, I gave my pledge and my word to the people of the community, not only in New Brunswick, but for the entire county, through the Mayors' Association, which I headed at that time, this pledge to them that involved something like $500,000 of their money, that this pledge would be kept so far as industry was concerned.

They went forward on my assurance, and after a spell of these retired years from municipal service, I feel a responsibility to at least try to emphasize that I am still cognizant and appreciative of the responsibilities then assumed.

But over and beyond that, you here today are interested as vitally as we are in seeing that the Raritan River is cleaned up.

The State Board of Health took charge some 35 or 40 years ago, and the conditions in the Raritan River, I am sorry to say, are just about as bad today as it was then.

Now, ladies and gentlemen, that is a long period of time. To appreciate that, all you have to do is look at me. (Laughter.) In 1935 I was a promising young man. Well, I am still promising, but no longer young. (Laughter.)

I am not here to criticize, because in a problem of this magnitude, criticism comes very readily and is very simple. It is a tremendous job that you are undertaking, and we are all, I think, mutually encouraged to be stimulated by the conferees here and their dedicated spirit, to appreciate the sacrifice that they make.

Before I get into the Raritan River situation, I want to make a suggestion here that is apropos of the last subject that was talked about, namely, the lack of personnel.

Now, in New Jersey, as in many States, we have a clean air problem, which is a handmaiden of clean water, and at Rutgers College very recently, within the last week or two, there have been plans evolved for classes in clean water students.

Now, that will not take care of our immediate problem, but for a long range Rutgers is establishing these courses that in the future will produce, in the men of tomorrow, the people who will solve these great problems that we are trying to solve today, and I bespeak your attention to that fact. They have not yet established a clean water class, but they will, I am sure. It will go with clean air.

Clean air has priority, because over in our State, as apathetic as the public has been, as indifferent as they are to many public menaces and hazards, they found very recently that they almost suffocated from smog, so they are more interested in clean air; but they are still interested in clean water.

Now, we do not have a problem that is earth-shaking in the Raritan River. Our principal problem -- we have a County Sewerage Commission that has jurisdiction in Middlesex County -- but our principal problem is regional, because just outside of our jurisdiction in Somerset County, the Middlesex County Sewerage Commission has no authority -- at least, they say they don't have it. I think they do. I think as a lower riparian owner and interested in the quality of water, that any upper stream polluter is answerable to him, but, at any rate, I am not saying that my law is the correct law. I am saying that is what I think it is.

The law problem down there, however, has a curious twist. We have a plant known as the Philip Carey plant -- and this will be interesting to you people because you will eventually head into the courts the way we have been heading into the courts.

Now, this plant, the Philip Carey plant, has been under orders to cease and desist for five years, and within the last two weeks, the Chancery Court refused an injunction to compel them to make these repairs, or to shut up.

Now, this was the second or third occasion that the State department brought this Philip Carey plant into court, and while we can appreciate that the closing of a plant is a hardship, and we do not want those sorts of solutions, nevertheless, for some people that is the only solution that is going to be, I think, salutary.

Now, why I mention that is this, and it is a very curious trend of legal reasoning: The court seemed to think that because the river was still polluted, that the

Philip Carey factory did not have to be shut down, because they said, "The river is already polluted, and so this plant might just as well go along with the rest of them and enjoy themselves."

That is a stalemate that we are reaching in a polluted area such as we have in Middlesex County through the Raritan River. If a plant is exonerated and immune from complying with the law because the water is already polluted, where are we going? We are going nowhere.

Now, most of our difficulty has originated with the American Cyanamid Calco Chemical plant at Bound Brook.

Thirty-five years ago, to this very summer, I stood in Trenton before the State Board of Health, and the Calco Company was there, and they promised at that time to put in pilot plants and correct the pollution, and they have not corrected it up to this day. I don't know whether it is because they can't correct it. I am inclined to think that is the answer, but if they can't correct it, there are other solutions. They can use pipelines to trunk it somewhere else. They can use the Middlesex Commission pipelines.

That was what I suggested when Governor Driscoll was governor of our State, and I was very friendly with him. I suggested to him that as long as the upper reaches of this river were polluted and came down through our City of New

Brunswick, that we would never clean up that river, and we never will until the upper reaches of that river are taken care of.

With all the respect that I can bring -- and I have great confidence in Dr. Kandle -- I am frank to say that I see now some glimmering of light, some improvement in many respects. There are some things that I think are wrong about enforcement in New Jersey. I think Dr. Kandle inherited this problem. He did not create it. He inherited it, and he is doing the best he can with a force that isn't giving him very much help.

Now, we have created a classification of waters, and just north of this great polluter, the Calco Chemical Plant, they have given it a classification of FW3, which is a pollution classification.

That area is on a direct line from the two new State reservoirs that have been created to create fresh water -- an additional volume of water for the Raritan River -- and why the State Board can classify an area FW3 as a pollution area on a stream which was intended by the expenditure recently of millions of dollars to create this fresh water and make it available as potable water at Bound Brook, I don't know.

F. F. Richardson

We not only object to that classification, but we object to the classification from New Brunswick on down to the Raritan Bay, and when I say "we object," I say it for this reason: New Brunswick has water rights in that river for potable water. It paid $300,000 for those rights, and those rights are being injured and damaged and prevented from being exercised today because of this pollution.

Now, who are these polluters? Let me ask you: Do they own the waters?

The waters of this State belong to the public. These people are trespassers. They are impinging upon the sovereignty of the public rights when they use these places as cesspools and drainage areas.

They should appreciate that. They have no inherent rights, and we have been very tolerant and lenient in applying sanctions against them, but time has run out. It has run out on the State Board of Health in the State of New Jersey for any further temporizing. It has run out, so far as the City of New Brunswick is concerned, because we need that water. We are short of water and we need it.

You know where we get it? From a canal that comes from the Delaware River and runs parallel to the Raritan River. We can't touch the Raritan River, but we have got to pay, and pay through the nose, for this canal water -- a most ridiculous, unsound, uneconomical, burdensome, foolish idea, because we don't want an industry to move.

Well, let me say this: If they want to move today, there is no place to move to, and they know it, so that that threat that they hang over our heads doesn't make too much sense.

What I would like to emphasize here as my reason for being here too is that all of us should be cognizant of the fact that on our clean water, the success of our campaign depends against industry and even against municipalities upon the understanding that the public is entitled to a reasonable use of this water.

Now, in New Jersey, as I indicate, there are cases that hold that even the State Board of Health cannot give a license on a river for a plant if the results of that license pollute the water to an extent that it is an unreasonable user, so that we will be in the courts over there eventually again, and maybe very shortly; but when we do we are suggesting or are going to suggest to the State Board of Health that instead of being turned down, as they were a couple of weeks ago by one of the judges in my own county on an injunction proceeding based upon the fact that they were polluting the water, if the State Board of Health would change their tactics and come in on the unreasonable use of the water, on the potential damage it is doing to the lower stream user -- for example, the damage it is doing to the City of New Brunswick.

We have 40,000 people. We are selling water that we get from the canal to some of our adjacent communities that are less fortunately situated than we are. We are trying to help what I call the hub of the water wheel in central New Jersey.

Now, we want our results to manifest themselves creditably and in cooperation with the waters of New York Bay, with the Kill Van Kull, and as these waters meet and merge, the chain is weakest maybe where the link is frailest.

There is no use of people in New York here talking about billions of dollars of expenditure if New Brunswick and the Middlesex County and New Jersey continue to let this polluted condition exist in the Raritan River. We are all in that kind of a boat where we must cooperate, and I think we will wind up cooperating; but sometimes it is a very difficult and harrowing experience.

I was here a year ago when Senator Kennedy was here, and Senator Kennedy at that time said that he thought that the difficulty in New York and New Jersey and elsewhere was one of enforcement, and was blamable, as he saw it, upon the local and the State Board of Health being a little bit on the apathetic side.

Well, now the problem is very visual. Everybody who runs can read. The public is more interested. I know down our way we have many water groups that are seriously interested, holding their meetings, putting out information, and all this is not their business. All this is at their own time, and the progress sometimes is disappointingly slow.

But I am sure that by the persistence, by the necessity of the occasion itself, the urgency, why, we will get somewhere, and if we do, we can congratulate ourselves that the great inarticulate helpless public that depends upon us will have some source of satisfaction in understanding that there are people yet who are working, so that the public rights may be protected.

Through the State officials and with the kind help of the Federal officials, which I think is a grand move in the right direction, we are bringing to public attention these things that the public wrath, if it has to be exercised, may be in the offing.

We don't want to suggest take-overs. We want these things to work out normally. I have never sued anybody to compel compliance. I have never even sued a private client. I am a very peacefully dispositioned fellow that tries to get along, but, after all, I haven't another thirty years to fool around. So I do bespeak the cooperation of everybody in solving not only New York City's problem, but these other problems.

When we were here before about a year ago, we were discussing the Hudson River problem, which is very similar to the Raritan River, but over our way we have spent millions of dollars creating new reservoirs. We have put 90 million gallons per day more water in the Raritan River. We are going to sell potable waters to the public that wants to buy them at a reasonable price. All this New Jersey has done.

We still have more to do, and I don't want anybody to think that here today New Jersey is at odds. I will support Dr. Kandle in his efforts with every ounce of strength, with every thought that I can bring to bear, and anything that the public can do stimulated by me in my area, they will have the full approval.

But we want results. We are crying out loud now, "Let us have action. Let us have an end to the excuses. Procrastination is a past and a dirty word. Let us go forward together and really accomplish these things."

I would be glad to answer any questions.

(Applause.)

(The following statement was submitted by Mr. Richardson for the record:

PAPER PRESENTED BY FORMER MAYOR FREDERICK F. RICHARDSON, NEW BRUNSWICK, N. J., ON RARITAN RIVER POLLUTION (JUNE 14, 1967)

(Dept. of Interior
U. S. Gov't hearing,
New York City)

I have represented the City of New Brunswick for a number of years, in connection with its water problems, and in that capacity have obtained considerable knowledge of the water situation relating to the Raritan River and its pollution.

As City Commissioner and Mayor of New Brunswick (1935-1943), I constructed the City's Sanitation Plant, now a part of the Middlesex County Sewerage System, and when this plant was built 1935-1936, the Mayors' Association of Middlesex County was assured by the State Board of Health, that as soon as municipal plants were built in our area, that the industrial plants on the river would be made to similarly comply with their treatment processes, so that the River could be effectively cleansed of pollution. At that time, the late Dr. King represented, before the State Board of Health, Calco Chemical Co. (Bound Brook), one of the worst polluters of the River, and through him, this plant promised the State Board in 1936 or thereabouts, that Calco would put in pilot plants and install new processes to stop pollution. All this was a part of a three-way public understanding, appearing in the public press at the time, which included the State Board of Health (then beginning its crackdown on municipalities 1935); the municipalities affected (some 8 or 10 at the time); and the offending big industries like Johnson & Johnson, Calco Chemical, Johns-Manville, etc. This three-way public understanding in 1935 had to be binding on all three parties, otherwise compliance by one and non-compliance by the others would nullify the great costs involved. Compliance orders went out to the big industries thirty years ago and although the municipalities built their plants, spent huge sums of money and were made to comply with State Board of Health specifications for River pollution, the enforcement against industry along the River has really never gotten off the ground.

F. F. Richardson

When the Middlesex Grand Jury investigated the State Board of Health's enforcement of industrial pollution in the Raritan River some 20 years ago, the State Board's Engineer, Mr. Shaw, promised salutory action by the State Board, once the Middlesex County Sewerage Commission began functioning and promised if this Commission did not clean up the River, the State Board of Health would act summarily against the industries polluting the River, especially Calco Chemical Co. at Bound Brook, which continued the big offender. This is all a matter of public record and can easily be verified.

The County Sewerage Commission has now been in operation over 15 years and this Commission now blames the present pollution condition of the River, principally on the fact, that Calco and some other Somerset County offenders, are outside of their jurisdiction. They are apparently rejecting the legal thesis that a reasonable user by upper riparian owners is required and accepting the idea that injuries by lower riparian owners must remain without legal recourse. I, of course, disagree radically with this interpretation of the law and the duties of the Commission. I call attention to the New Jersey case of Westville vs. Whitney Homes, on the doctrine of reasonable user (N. J. Super 1956, 40 N. J. Super 62; 122 A(2) 233). Other applicable cases involving the enforcement powers of the State Board of Health and the Sewerage Commission may be found in the cases cited in the Westville case (supra), but the law is very plain that not even the State Board of Health can give immunity to pollution, where its effect constitutes an unreasonable use of the river water. I contend that the present pollution of the Raritan River constitutes just such an unreasonable use and that no further time orders by the State Board of Health are acceptable. After all, some of these orders, like Calco's, run back to 1935-1936, not the dates set forth in the just issued Summary Report by the U. S. Dept. of Interior (May 1967 - pg. 19).

If the Federal Government continues to allow plants like Calco to continue to pollute the River, citizens will be obliged to resort to Chancery action at their own expense, plus whatever municipal help may be available, and time has already run out on plants like Calco, which still continues one of the largest sources of River pollution in the upper part of the stream.

In this connection, we call the Dept. of Interior's attention to the great disparity in the compliance between what New York City shows (pg. 21) as against what New Jersey Dept. of Health shows (pg. 19) on this aforementioned Summary Report, and ask the Dept. to draw its own conclusion. The Philip Carey case (pg. 19) within the last two weeks was "held over" by Judge Furman, of the N. J. Chancery Court (Middlesex Cty.) for later action, but it will be seen that this offender has been on the "cease and desist" orders since Dec. 1, 1961, which is nearly six long years without any action that is meaningful. Some offenders have had orders to stop pollution as far back as 1962, some six offenders since 1963, and two in 1964, and as I have said, one (Calco) since 1935. I need not emphasize that cease and desist orders which are not enforced, make a mockery of genuine enforcement and cause a loss of public confidence in the agency responsible. There is a present loss of confidence in this agency that is thoroughly justified. Secondly, there is dissatisfaction with the present classification of the River by the State Board of Health. The area north of Bound Brook (FW3) is one that should be classified as public potable water. Below Bound Brook (Fieldville Dam) TW classifications are totally out of line because not only has the City of New Brunswick rights in the River, to use it as potable public supply, but the building of the two new State reservoirs was intended to permit this use of the River to and below New Brunswick, as a means of easing water shortage. New Brunswick, with all this water running past its doorstep going to waste, is forced to buy water as are some other communities and private water companies, from the adjacent canal supplies, a most ridiculous and unsound and burdensome arrangement. All this can be and is chargeable to the continued pollution of the Raritan River, mostly due to industrial pollution. With booming growth in the Raritan Valley, with a dire shortage of water, to continue the pollution of the River will be a short-sighted, almost criminal offense against the rising generation. We certainly can and should avail ourselves of this great water potential in a far more meaningful way than we are now doing. Federal cooperation, yes, leadership and enforcement, may be the answer.

I am sure that the arguments advanced by industries have by now been properly evaluated. When contrasted to public health and public welfare, the cost argument has no weight. In any event, these waters like the Raritan River, belong to the public. They are not in any sense the property of these industrial companies, except as usurpers and trespassers. The argument that certain wastes cannot be treated is likewise without weight because if it cannot be treated, they can be run off into a pipeline and disposed of elsewhere than in the River. Time, as I have said, about enforcement has likewise run out on these excuses.

The public is demanding proper enforcement of the pollution laws of this State and of the Federal Government. The public, in my area, is sick and tired of time-consuming excuses and delays. We have arrived at the high noon of this problem and we ask Federal help -- Federal enforcement -- Federal take-over, if necessary, to get these results. Most of our large daily papers are clamoring for action. Many organizations are pressing for results. But most of all the helpless, the inarticulate, the taxpaying public cries aloud for relief and asks again and again, "Oh, Lord, how long - Oh, Lord.")

* * *

MR. STEIN: Are there any questions or comments?

(No response.)

MR. STEIN: If not, thank you very much.

DR. KANDLE: Thank you.

MR. STEIN: We have two more speakers listed. In order to plan the meeting, I wonder if we could possibly call on them now. We do not want to cut anyone off. The question is whether we recess for lunch or do this first.

Mr. Johnson, could you give us an idea of how long your statement will be?

MR. JOHNSON: Very brief. Actually, I would take about ten minutes or less, if you want to do it before lunch.

MR. STEIN: Let's try this before lunch then.

MR. HENNIGAN: The next New York speaker will be Mr. Charles C. Johnson, Jr., Assistant Commissioner, Environmental Health Services of the New York City Department of Health.

STATEMENT OF CHARLES C. JOHNSON, JR., ASSISTANT COMMISSIONER, ENVIRONMENTAL HEALTH SERVICES, NEW YORK CITY HEALTH DEPARTMENT, NEW YORK, NEW YORK

MR. JOHNSON: Mr. Chairman, Distinguished Conferees and Associates that are here to discuss the pollution problems of the Raritan Bay and adjacent interstate waters:

I wish to make a brief statement relative to the policies of the New York City Health Department with relation to this conference and to the water pollution program in New York City.

Chapter 22, Section 556 of the New York City Charter, states in part, and I quote:

a) "The Health Department shall have jurisdiction to regulate all matters affecting the Health of the City.

b) "The authority, duties and powers shall extend over the City and over the waters adjacent thereto, within the jurisdiction of the City."

It should also be pointed out that in Article 145, Water Pollution Control, of the New York City Health Code, the Health Department has been given the responsibility to pass on plans for proposed pollution control facilities. The Department of Health is concerned with pollution control from the broad viewpoint of health. It is the aim of this Article to give the Department authority to control sources of pollution and to cooperate with other government agencies in the development of pollution abatement programs in addition to meeting the necessary requirement of sound sanitary engineering. This section of the Health Code also gives to us a prime responsibility in implementing pollution abatement programs and evaluating the proper operation and maintenance of pollution control facilities.

In view of these authorities, I was surprised and chagrined to learn that the City Health Department was not officially notified of this conference and learned of its existence only through the news media. I hope that we can now be placed on your official mailing list for proper notification of all future conferences of this type.

Let me now speak about the Conference Report:

With reference to the status of the various abatement programs of the industrial waste discharges into the Raritan Bay area, the policy of the City Health Department has been to limit the number of discharges into its water and to promote, whenever possible, industries to tie into the municipal sewer system. This policy has had some deterrent effect on the elimination of some industries' pollutional load because of the current schedule in the city for the construction of sewers and sewerage treatment plant facilities. Three polluters, Mt. Loretto Home, St. Joseph By The Sea and Richmond Memorial Hospital, have complied with issued orders. The conference report cites the following industrial plants, Nassau Smelting & Refining Co., Inc., Procter & Gamble Manufacturing Co., and S. S. White Co. These industrial plants will connect to city sewers as soon as they are built.

I understand that you heard from our representative of our Department of Public Works, and he gave you a schedule as to what New York City is doing in order to complete its sewerage system to comply with the orders of this conference.

We are pleased to report that our engineering staff assigned to water pollution control has been increased and we are in an even better position to cooperate with all agencies, as we have in the past, to promote the rapid construction of the sewerage system within New York City, in order to protect the public health and the common good.

Progress in the city's abatement program has been made possible through the cooperation of Federal, interstate, State and city agencies.

Thank you.

MR. STEIN: Thank you, Mr. Johnson.

Are there any comments or questions?

(No response.)

MR. STEIN: Thank you.

Again, we talk about personnel, and here, Mr. Johnson and I have been old colleagues. I understand he has been detailed to New York.

Speaking for myself and my experience with him through the years, you can't do better. He is one of the really top professionals in this business.

Dr. Kandle?

DR. KANDLE: We will now hear from New Jersey's last speaker, Mrs. Yuhasz from the Morgan Bayview Association.

STATEMENT OF MRS. VIRGINIA YUHASZ, RECORDING SECRETARY, MORGAN AND BAYVIEW MANOR IMPROVEMENT ASSOCIATION, MORGAN, NEW JERSEY

MRS. YUHASZ: Mr. Chairman, Conferees, Ladies and Gentlemen:

My name is Virginia Yuhasz. I am recording secretary of the Morgan and Bayview Manor Improvement Association, Morgan, Borough of Sayreville, New Jersey. I am here today to speak on behalf of my organization.

Some of you may know that Morgan used to be a small resort area just south of Perth Amboy on the Raritan Bay, known for many years for its clamming and fishing and bathing, boating, etc. I can even remember as a child being called a "clam digger." I took offense at that time, but since things have developed, I think I would like to be called it again (laughter).

Then the waters of the Raritan became so contaminated and polluted that we could no longer swim, fish or clam.

I believe that is the reason we are all here today, to see to it that the Raritan Bay and the surrounding waterways are returned to their former condition and that people will once again be able to enjoy the pleasures they had so many years ago. We Morganites hope to possibly return our community to a small resort status.

Some may say this is only a dream, but I am told that if the present Federal Water Pollution Control Plan is carried out and no additional pollution or effluent is added, that this dream could become a reality by 1971 or 1972.

However, there appears to be a threat to this dream, a fly in the ointment. Nine years ago, when the Borough of Sayreville purchased 66 acres of land fill on the Raritan Bay in Morgan, or, to quote the Mayor of Sayreville, one of the finest bayfront park and recreation sites, we believed we would have a beautiful marine park. Today, this area is being offered as a site for one of the dirtiest, filthiest, unhealthiest industries known to man, the aluminum reduction industry.

Not only does this industry have the reputation of being injurious to human health, animals and vegetation, it will utilize a minimum of 12 million gallons of water per day.

I do not have to tell you that water is at a premium in New York and New Jersey, and especially in

Middlesex County. Why, as recently as yesterday, there were 250 persons in the Borough of Sayreville without water, drinking water or sanitary water. They had been without water for seven days.

Shall we sacrifice everything? It is time that industries and municipalities as well realize that they have a moral obligation to the people.

Industry takes advantage of our natural resources, such as water, easy access by boat or rail or dock, and in return they give us employment and lowered taxes, but I ask you: Is that enough? Is it enough? I say no, it is not.

They are destroying the very thing that enticed them to our area. They cannot go on polluting the water and the air as freely as they have in the past. Even farmers had to learn crop rotation, and so industries must learn that they have to give back what they have taken.

It is time for our municipal officials also to realize that they must screen each new industry carefully before allowing a potential pollution threat to locate in our area.

Determining the amount of the pollution is a very important job of the Federal Water Pollution Agency. It is to them that we take our hats off today. It has been a very long and tedious task, but it has not gone unnoticed or unappreciated.

This is only the beginning of a new and wonderful dream, clean water for everyone. Keep up the excellent work for the sake of all mankind.

Hats off also to Dr. Kandle and Richard Sullivan of the New Jersey Department of Health, whose recent efforts in pollution abatement are most appreciated. Though the New Jersey Department of Health had seemed lax in the past, they have come to the forefront recently, and we hope they will stay there to the ultimate good of the citizenry of New Jersey and New York as well.

On behalf of my organization, in closing I would like to say we not only ask that our land fill be utilized for recreation; we demand that it be used for such.

Let it be known from Governor Hughes' office in Trenton to Governor Rockefeller's office in Albany that we will fight to protect our rights, as well as the rights of all creatures -- fowl, fish, game and wildlife -- that abide on the land and in the waters that are ours. This shall be our testament of love to future generations.

Thank you, Dr. Kandle.

MR. STEIN: Thank you.

Are there any questions or comments?

(No response.)

MR. STEIN: Are there any other speakers?

MR. PFAFFLIN: Yes.

MR. STEIN: Do you have anything to say?

STATEMENT OF JAMES R. PFAFFLIN, REPRESENTING THE RARITAN ANTI-POLLUTION ASSOCIATION

MR. PFAFFLIN: My name is James Pfafflin. I am Chairman of the Raritan Anti-Pollution Association and, by training, a sanitary engineer.

Last night I was the recipient of several phone calls asking that I present a statement today on behalf of our association concerning one specific problem which is bothering us considerably within the bay area. That is the problem of oil pollution, which has not been discussed in great depth or detail, unfortunately, at the conference.

We have since 1961 been the victim, I should think, on an average of once a week, of either quite serious or rather mild oil spills. We are of the opinion that these "accidental" spills come from a quite specific area on the Arthur Kill.

We wish to call the attention of this conference to our opinion that there can be no durable solution to

Raritan Bay pollution as long as we are blessed with this specific industrial waste. If one segment of New Jersey's industry is above the law and the political situation in New Jersey indicates that this is the case, we submit there can be no lasting solution to the pollution problem.

I thank you.

MR. STEIN: Thank you very much.

As a matter of fact, the conferees are very mindful of that problem.

MR. PFAFFLIN: Yes, sir.

MR. STEIN: I believe we are going to solve that.

We have had problems like that with concentrations of similar degrees around Chicago, and we solved it there. I think we know how to do it, and when the program gets under way of the clean-up of the waters that you mentioned, that certainly will be one of the things we will take care of.

MR. PFAFFLIN: I may say, Mr. Stein, we have the utmost confidence in all the agencies concerned.

MR. STEIN: Thank you.

With that, let me try to give you the schedule, and I hope I am not being too optimistic, so that we will know what we are doing. I hope to meet the schedule.

We will recess now and the conferees will reconvene very shortly after they have a chance to wash, and eat in the Regency Room, which is on the fourth floor. Then we hopefully will be able to reconvene here at three o'clock and have a statement for issuance.

With that, I think we had better get started, and we stand recessed until three o'clock.

(Whereupon, at 12:00 o'clock noon, a recess was taken.)

AFTERNOON SESSION

(3:40 p.m.)

MR. STEIN: May we reconvene?

We have one additional statement for the record from Captain Brian A. McAllister of McAllister Brothers, Inc. I think they run a barge and tugboat firm.

As a matter of fact, he was here today and I told him we were on the Battery a day or two ago and I saw a boat called The Brian McAllister in red and gold, and he said, "Yes, that boat is named after me."

But, you know, after us they name sewage treatment plants (laughter).

You think that's funny.

Do you know, one of the grand old men of our business -- I see Hayes Black, who, when you talk about experts, is the top industrial waste consultant, in my opinion, in the business. Why don't you stand up, Hayes, and let them see you?

Hayes Black has worked with us for years. Hayes knows this fellow, and he worked at Michigan, and his name was Milton P. Adams.

For, oh, since the beginning of time, as far as I knew, he was the head of the Michigan Water Pollution Control Agency. Finally we got our bill through after the

1948 one, when we really got some money, in 1955, and he was really active in the bill, in getting the legislation through.

Then, when we had the first grant under the program, one of the first ones was in Michigan.

I said, "Milt, with all the work you have done for water pollution control, why don't we name this first plant the Milton P. Adams Sewage Treatment Plant?"

And he said, "My gosh, don't do that. There's enough controversy about my middle initial as it is." (Laughter.)

(The statement of Captain McAllister is as follows:

STATEMENT OF CAPTAIN BRIAN A. McALLISTER,
McALLISTER BROTHERS, INC., 17 BATTERY PLACE,
NEW YORK CITY, NEW YORK

"To the Conference on Pollution of Raritan Bay and Adjacent Interstate Waters

"Dear Mr. Stein:

"The firm I represent operates tugs and barges specifically designed to carry sewerage sludge and industrial waste to sea.

"We feel the method of barging the pollutants from our rivers and streams out into the safe and approved designated areas of the ocean has been completely overlooked. The history of the Raritan area has shown that your agencies can not wait for more studies, but it is time for action. Besides being the most economical system available it is also a system that can be put to use immediately.

"Our barges can be at any plant near the water and a simple pipeline to the barge instead of the river is all that is needed.

"This is our position and we hope your conferees will put more emphasis on this immediate and practical solution to the problem of pollution.

"Thank you.

/s/ Brian A. McAllister.")

* * *

MR. STEIN: We now come to the conclusions of the conferees. We expect to have duplicated copies available for the press and others as soon as possible.

I am happy to announce that the conferees arrived at a unanimous agreement. In the light of conference statements and discussion, the conferees at the third session agreed to the following conclusions and recommendations:

1. Pollution of the interstate waters of Raritan Bay and its tributaries is occurring due to the discharge of inadequately treated municipal and industrial wastes.

2. Considerable progress has been made towards abating the pollution problem.

3. Progress has not been more rapid because of the complexity of the discharges and the difficulties in dealing with controlling pollution in an estuarine system of waters such as exists in Raritan Bay.

4. Still more has to be done to abate pollution of the Raritan Bay area, even though most wastes in the area are now receiving treatment.

5. All wastes prior to discharge into waters covered by this conference, including the Raritan Bay, Arthur Kill, and the Raritan River system, shall be treated to a degree providing as a minimum 80 percent reduction of biochemical oxygen demand at all times, including any four-hour period of a day when the strength of the wastes to be treated might be expected to exceed average conditions. It is recognized that this will require a design of an average removal of 90 percent of biochemical oxygen demand.

6. Effective year-round effluent disinfection

shall be provided at all municipal plants and all industrial plants with bacterial discharges.

7. Industrial treatment facilities to accomplish such reduction shall provide removals at least the equivalent of those required for municipal treatment plants.

8. Facilities and procedures are to be established to provide laboratory control for each treatment facility.

9. The schedule for remedial action is as follows:

That which has been proposed by the States of New York and New Jersey and has largely been included in orders and stipulations by those States.

This means that the schedules for remedial action by New York and New Jersey have been accepted by the conferees. All of the improvements will be in operation between 1967 and 1970, except that the expansion of one plant will be in operation by 1971, and one interceptor will be completed in 1972.

I think we can expect continued and progressive improvement of the water quality in this area.

10. The conferees shall meet every six months to review and evaluate progress on water quality improvement.

These meetings in the past and, I expect, in the future, are publicized and open to the public, so you can come and watch it and see how well we do our job.

11. The conferees have appointed a technical committee to further evaluate the effects of the shipping channel through Raritan Bay and dredging on water quality. The committee shall consist of Mr. David H. Wallace, Director of Marine Fisheries, New York State Conservation Department, Chairman; and Mr. George Cowherd, Assistant Chief Engineer, Interstate Sanitation Commission; Anthony Ricigliano, Supervising Public Health Engineer, New Jersey State Department of Health; and Mr. Paul DeFalco, Deputy Director, Federal Water Pollution Control Administration.

Are there any comments or statements by the conferees?

(No response.)

MR. STEIN: I think this was a very successful conference. This represents many years of hard work by the staffs of all the agencies represented at the table. I don't think it concludes it. Maybe it is the beginning, but it is at least the beginning of hard work.

Where we have agreement of the States, the interstate agency, and the Federal Government, I believe this will give us clean waters of the Raritan Bay within the foreseeable future.

Because of the nature of the waters and the nature of the problem, it took many years to study and, as you well know, some of the most delicate negotiations in the field of Federal-State relations.

I would like to thank all the conferees -- Mr. Glenn, Mr. Klashman, Dr. Kandle and Mr. Hennigan -- their predecessors and their staffs, for working wholeheartedly toward this end.

This has not been an easy job. The relationships in this area were about as complex as we ever had. The only reason I think we came this far is because of the commitment and the dedication of all the people at the table to the field of clean water.

At this time I would really like to single out and give my commendation to Dr. Kandle. Most of the other people at the table, at least the four that are here, primarily and almost exclusively work with water quality. Dr. Kandle has a variety of other duties, as you well know, running the whole gamut of a health program. For a health officer to be this much interested in the quality of water and to bring the full force and effect of the State to work with us, is indeed an achievement. It speaks for the breadth of Dr. Kandle's interest in the entire broad field of public health and his interest in a clean environment.

I would like to thank you all for coming and participating and staying with us.

We stand adjourned.

(Whereupon, at 3:50 p.m., the conference was adjourned.)

Third Session of Conference in the Matter of Pollution of Raritan Bay and Adjacent Interstate Waters, convened at the Waldorf-Astoria Hotel, New York, New York, on June 13 and 14, 1967.

PRESIDING:

Mr. Murray Stein, Assistant Commissioner for Enforcement, Federal Water Pollution Control Administration, Department of the Interior

APPENDIX

1k

NATIONAL SHELLFISH
SANITATION PROGRAM
MANUAL OF OPERATIONS

Part I

SANITATION
of
SHELLFISH
GROWING AREAS

1965 Revision

U.S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
PUBLIC HEALTH SERVICE

2k

NATIONAL SHELLFISH SANITATION PROGRAM
MANUAL OF OPERATIONS

Part I

SANITATION OF
SHELLFISH
GROWING AREAS

1965 Revision

Edited by

Leroy S. Houser, Sanitarian Director

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE

Division of Environmental Engineering and Food Protection
Shellfish Sanitation Branch
Washington, D.C., 20201

3k

This is part I of two companion volumes published by the Public Health Service with titles and publication numbers as follows:

National Shellfish Sanitation Program

Public Health Service Publication No. 33
(Revised 1965) Part I -- Sanitation of Shellfish
Growing Areas

Public Health Service Publication No. 33
(Revised 1965) Part II -- Sanitation of the
Harvesting and Processing of Shellfish

This is a revised edition published previously under the title: Cooperative Program for the Certification of Interstate Shellfish Shippers, Part I, Sanitation of Shellfish Growing Areas, 1962 Revision.

PUBLIC HEALTH SERVICE PUBLICATION NO. 33
Part I -- Revised 1965

4k

LIST OF PREVIOUS EDITIONS OF MANUAL OF OPERATIONS FOR NATIONAL SHELLFISH SANITATION PROGRAM -- NOW SUPERSEDED

1925. Supplement No. 53 to Public Health Reports November 6, 1925 "Report of Committee on Sanitary Control of the Shellfish Industry in the United States".

1937. U.S. Public Health Service Minimum Requirements for Approval of State Shellfish Control Measures and Certification for Shippers in Interstate Commerce (Revised October 1937).

1946. Manual of Recommended Practice for Sanitary Control of the Shellfish Industry Recommended by the U.S. Public Health Service (Public Health Bulletin No. 295).

1957. Manual of Recommended Practice for Sanitary Control of the Shellfish Industry (Part II: Sanitation of the Harvesting and Processing of Shellfish). Printed as Part II of Public Health Service Publication No. 33.

1959. Manual of Recommended Practice for Sanitary Control of the Shellfish Industry (Part I: Sanitation of Shellfish Growing Areas). Printed as Part I of Public Health Service Publication No. 33

1962. Cooperative Program for the Certification of Interstate Shellfish Shippers, Part II, Sanitation of the

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Harvesting and Processing of Shellfish. (Printed as Part II of Public Health Service Publication No. 33.)

1962. Cooperative Program for the Certification of Interstate Shellfish Shippers, Part I, Sanitation of Shellfish Growing Areas. (Printed as Part I of Public Health Service Publication No. 33.)

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FOREWORD

A DECLARATION OF PRINCIPLES

The National Shellfish Sanitation Program is an unusual teaming of State and Federal resources to preserve and manage a natural resource for a beneficial use. Although the current program is of comparatively recent origin, its development can be traced back through several centuries of American history. When the European colonists arrived they found almost unimagined natural wealth. Forests, rich agricultural land, minerals, and space itself, were present in quantities and a variety previously unknown. To these settlers one of the most valuable and readily useable of these natural resources was the food resources of the sea, particularly the estuaries. It is not surprising that shellfish were foremost among their staple food items.

The value of these renewable natural resources to the early settlers was reflected in colonial legislation designed to encourage their wise use. In 1658 -- over 300 years ago -- the Dutch council of New Amsterdam passed an ordinance regulating the taking of oysters from the East River. Other early legislation, including that of New York (1715), New Jersey (1730), and Rhode Island (1734), was designed to regulate harvesting, presumably as conservative measures to guarantee a continuing supply.

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The public health problems which were associated with shellfish in the United States in the first two decades of the present century brought a new dimension to natural resource utilization; i.e., shellfish could not be used for food unless of acceptable sanitary quality. This concept was clearly recognized in the Public Health Service sponsored conference of 1925 in which the concepts of the present cooperative program were first outlined and the administrative foundation put down. All parties seemed to recognize, and accept as fact, the premises that: (1) shellfish represented a valuable natural food resource; (2) the cultivation, harvesting, and marketing of this food resource were valuable components in the financial bases of many coastal communities; (3) a State and Federal program was necessary to permit the safe use of this resource; and (4) the transmission of disease by shellfish was preventable and therefore not to be tolerated. It is significant that the founders of this program did not take the parochial stand that the only completely safe way to prevent disease transmission by shellfish was to prohibit its use. Instead, they held that this beneficial use of the estuaries was in the best public interest, and that sanitary controls should be developed and maintained which would allow safe use. These concepts were recognized in the program which evolved following the report of the "Committee on Sanitary Control of the Shellfish Industry in the United States" in 1925.

In 1954 the Surgeon General of the U.S. Public Health Service called a second national conference to discuss shellfish sanitation problems. Specifically, the 1954 conference addressed itself to the questions of the practicality and need for this tripartite program. There was general agreement that, despite the profusion of technical problems, the basic concepts were sound and that it was in the public interest to maintain the program. Thus, the presence of an irrevocable bond between the application of sanitary controls in the shellfish industry and the continuing beneficial use of a renewable natural resource was again confirmed.

Despite this long established relationship the national program has tended to neglect the second of these biphasic goals -- use of a valuable natural resource -- and to concentrate on the negative policy of closure of areas of unsuitable sanitary quality. Little effort has been made by the program to develop a compensatory element which would encourage corrective action by State or Federal agencies. Similarly, the program has not taken a position on the use of conservation law even when it was known that this would increase the program's consumer protection confidence factor.

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In recognition of past history of the shellfish industry in the United States and of the relationship of the National Shellfish Sanitation Program to the effective use of this natural resource, the 1964 Shellfish Sanitation Workshop endorses the following principles:

1. Shellfish are a renewable, manageable natural resource of significant economical value to many coastal communities, and which should be managed as carefully as are other natural resources such as forests, water, and agricultural lands.
2. Shellfish culture and harvesting represents a beneficial use of water in the estuaries. This use should be recognized by State and Federal agencies in planning and carrying out pollution prevention and abatement programs and in comprehensive planning for the use of these areas.
3. The goals of the National Shellfish Sanitation Program are: (1) the continued safe use of this natural resource and (2) active encouragement of water quality programs which will preserve all possible coastal areas for this beneficial use.

12k It is the conviction of the 1964 National Shellfish Sanitation Workshop that survival of the shellfish industry is in the best public interest; that by application of the above principles on a State-by-State basis shellfish can continue to be used safely as food and to make a valuable contribution to the economic structure of the Nation both in the immediate present and in the foreseeable future.

INTRODUCTION

In 1925 State and local health authorities and representatives of the shellfish industry requested the Public Health Service to exercise supervision over the sanitary quality of shellfish shipped in interstate commerce. In accordance with this request, a cooperative control procedure was developed. In carrying out this cooperative control, the States, the shellfish industry, and the Public Health Service, each accept responsibility for certain procedures as follows.

1. Procedures To Be Followed by the State. -- Each shellfish-shipping State adopts adequate laws and regulations for sanitary control of the shellfish industry, makes

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sanitary and bacteriological surveys of growing areas, delineates and patrols restricted areas, inspects shellfish plants, and conducts such additional inspections, laboratory investigations, and control measures as may be necessary to insure that the shellfish reaching the consumer have been grown, harvested, and processed in a sanitary manner. The State annually issues numbered certificates to shellfish dealers who comply with the agreed-upon sanitary standards, and forwards copies of the interstate certificates to the Public Health Service.

2. Procedures To Be Followed by the Public Health Service. -- The Public Health Service makes an annual review of each State's control program including the inspection of a representative number of shellfish-processing plants. On the basis of the information thus obtained, the Public Health Service either endorses or withholds endorsement of the respective State control programs. For the information of health authorities and others concerned, the Public Health Service publishes a semi-monthly list of all valid interstate shellfish-shipper certificates issued by the State shellfish-control authorities.

3. Procedures To Be Followed by the Industry. -- The shellfish industry cooperates by obtaining shellfish from safe sources, by providing plants which meet the agreed-upon

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sanitary standards, by maintaining sanitary plant conditions, by placing the proper certificate number on each package of shellfish, and by keeping and making available to the control authorities records which show the origin and disposition of all shellfish.

The fundamental components of this National Shellfish Sanitation Program were first described in a Supplement to Public Health Reports, "Report of Committee on Sanitary Control of the Shellfish Industry in the United States" (1925). This guide for sanitary control of the shellfish industry was revised and reissued in 1937 and again in 1946. It was separated into two parts by publication of Part II, Sanitation of the Harvesting and Processing of Shellfish in 1957 and by publication in 1959, of Part I, Sanitation of Shellfish Growing Areas. The need for a specialized program of this nature was reaffirmed at the National Conference on Shellfish Sanitation held in Washington, D.C., in 1954 (1) and at the Shellfish Sanitation Workshop held in 1956 (2), 1958 (3), 1961 (67) and 1964 (68).

This edition of the shellfish sanitation manual has been prepared in cooperation with the State shellfish control authorities in all coastal States, food control authorities in the inland States, interested Federal agencies, Canadian Federal departments, the Oyster Institute of North America, the Pacific Coast Oyster Growers Association, and the Oyster

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Growers and Dealers Association of North America.

Since the growing and processing of shellfish are two distinct phases of operation in the shellfish industry, the manual has been prepared in two parts: I: Sanitation of Shellfish-Growing Areas; and II: Sanitation of the Harvesting and Processing of Shellfish. This, Part I of the manual, is intended as a guide for the preparation of State shellfish sanitation laws and regulations, and for sanitary control of the growing, relaying, and purification of shellfish. It is intended that States participating in the National Shellfish Sanitation program for the certification of interstate shellfish shippers will be guided by this manual in exercising sanitary supervision over shellfish growing, relaying, and purification, and in the issuing of certificates to shellfish shippers.

The manual will also be used by the Public Health Service in evaluating State shellfish sanitation programs to determine if the programs qualify for endorsement. Part III of the manual, "Public Health Service Appraisal of State Shellfish Sanitation Programs", sets forth appraisal procedures in evaluating State shellfish sanitation programs and is based on the requirements contained in parts I and II.

The provisions of this manual were accepted at the Shellfish Sanitation Workshop held in Washington, November 17-19, 1964, and unless otherwise stated become effective 60 days after publication (68).

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DEFINITIONS

And/or. -- Where this term is used, and shall apply where possible; otherwise, or shall apply.

Area, growing. -- An area in which market shellfish are grown.

Coliform group. -- The coliform group includes all of the aerobic and facultative anaerobic, Gram-negative, non-spore-forming bacilli which ferment lactose with gas formation within 48 hours at 35° C. Bacteria of this group which will produce gas from E. C. medium within 24 hours at 44.5° C. in a water bath will be referred to as fecal coliforms.

Controlled purification. -- The process of removing contamination from whole live shellfish acquired while growing in polluted areas.

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National shellfish sanitation program. -- The cooperative State-PHS-Industry program for the certification of interstate shellfish shippers as described in Public Health Service Publication Number 33, National Shellfish Sanitation Program Manual of Operations, Parts I and II.

Depletion. -- The removal of all market-size shellfish from an area.

Most probable number (abbreviated MPN). -- The MPN is a statistical estimate of the number of bacteria per unit volume, and is determined from the number of positive results in a series of fermentation tubes. A complete discussion of MPN determinations and computations, including MPN tables, can be found in the American Public Health Association publication "Standard Methods for the Examination of Water and Waste Water". (4) (5).

Population equivalent (coliform). -- A quantity of sewage containing approximately 160×10^9 coliform group bacteria. This is approximately equal to the per capita per day contribution of coliforms as determined in a metropolitan sewerage system (6) (7) (8).

Sanitary survey. -- The sanitary survey is the evaluation of all factors having a bearing on the sanitary quality of a shellfish growing area including sources of pollution, the effects of wind, tides, and currents in the distribution and dilution of the polluting materials, and the bacteriological quality of the water.

Shellfish. -- All edible species of oysters, clams, or mussels, either shucked or in the shell, fresh or frozen.

Shellfish, market. -- Shellfish which are, may be, or have been harvested and/or prepared for sale for human consumption as a fresh or frozen product.

State shellfish control agency. -- the State agency or agencies having legal authority to classify shellfish growing areas and/or to issue permits for the interstate shipment of shellfish in accord with the provisions of this manual.

State shellfish patrol agency. -- the State agency having responsibility for the patrol of shellfish growing areas.

Transplanting. -- The moving of shellfish from one area to another area.

SECTION A

GENERAL ADMINISTRATIVE PROCEDURES

1. State Laws and Regulations. -- State laws or regulations shall provide an adequate legal basis for sanitary control of all interstate phases of the shellfish industry. This legal authority shall enable one or more departments or agencies of the State to classify all coastal waters for shellfish harvesting on the basis of sanitary quality; effectively regulate the harvesting of shellfish; effectively prosecute persons apprehended harvesting shellfish from restricted, prohibited, or nonapproved areas; regulate and supervise the shipment and storage of shell stock, and the shucking, packing, and repacking of shellfish; make laboratory examinations of shellfish; seize, condemn, or embargo shellfish; and restrict the harvesting of shellfish from particular areas and suspend interstate shipper certificates in public-health emergencies.

Satisfactory compliance. -- This item will be satisfied when the State has legal authority to --

a. Classify all actual or potential shellfish growing areas as to their suitability for shellfish harvesting on the basis of sanitary quality as defined in section C of this manual. (It is strongly recommended that a State permit be required for the growing of shellfish, and that such permits be revocable or subject to suspension for just

20k cause. It is also recommended that the State have authority to regulate the discharge of sewage, radioactive, and other toxic wastes from boats in the vicinity of approved shellfish growing areas.)

b. Control the harvesting of shellfish from areas which are contaminated or which contain marine shellfish poisons. To be effective this authority must allow the State to --

(1) Patrol growing areas.

(2) Apprehend persons violating the restrictions.

(3) Effectively prosecute persons apprehended harvesting shellfish from restricted or prohibited areas. (Penalties for such violations should be sufficient to discourage illegal harvesting.)

c. Regulate and supervise relaying, depletion, wet storage, and controlled purification as described in this manual if these techniques are used.

d. Require that shell stock in storage or in transit from the growing area to the certified shipper be protected against contamination; i.e., every person, firm or

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corporation that handles shellfish up to the certified shipper will be subject to sanitary control by an official agency but will not necessarily be required to have a State shellfish permit.

e. Prohibit national program shippers from possessing or selling shellfish from out-of-State sources unless such shellfish have been produced in accord with cooperative program requirements.

f. Regulate the operations of shucker-packers, repackers, shell stock shippers and reshippers in accord with the applicable provisions of part II of this manual.

g. Restrict the harvesting of shellfish from specific areas, and suspend interstate shipper certificates in a public-health emergency. Administrative procedures required in connection with such emergency actions should not require more than one day to complete.

h. Prevent the sale, shipment, or possession of shellfish which cannot be identified as having been produced in accord with national program requirements or which are otherwise unfit for human consumption, and to condemn, seize, or embargo such shellfish. This authority need not be specific for shellfish and may be included in other State food laws.

Public-health explanation. -- The National Program was developed by the 1925 Conference on Shellfish

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Pollution to meet the specific publi-health need resulting from the 1924-25 thphoid epidemic (9).

However, the National Program has gone beyond the original objective of insuring that shellfish shipped interstate would not be the cause of communicable disease. Thus, in the 1940's, paralytic shellfish poison became a matter of public-health concern and steps were taken to protect the public against this hazard. In 1957 it was recognized that shellfish might concentrate certain radionuclides and that a radiation surveillance activity might become a necessary adjunct to the established procedures.

To accomplish these public-health objectives the State must supervise all phases of the growing harvesting, transportation, shucking-packing, and repacking of shellfish to be shipped interstate. It is also important that shellfish be properly refrigerated and protected against contamination during interstate shipment. This is not easily accomplished by the State of origin although certified shippers are required to pack shellfish in containers which will protect them against contamination.

If State supervision is to be effective all phases of the activity must be supported by legal authority. This authority may be either a specific law or regulation.

23k The success with which the State is able to regulate the several components of the shellfish industry provides a measure of the adequacy of the statutory authority.

The unique nature of shellfish as a food also makes it necessary that the State shellfish control agency have authority to take immediate emergency action to halt harvesting or processing of shellfish without recourse to lengthy administrative procedures. As examples, a State may find it necessary to close a shellfish growing area within hours of a breakdown in a sewage treatment plant or the unexpected finding of paralytic shellfish poison.

Periodic revisions of State shellfish laws or regulations may be necessary to cope with new public-health hazards and to reflect new knowledge. Examples of changes or developments which have called for revision of State laws include the wide-scale use of pleasure boats with the resulting probability of contamination of shellfish growing areas with fresh fecal material, the conditionally approved area concept resulting from the construction of sewage treatment works, and the apparent ability of shellfish to concentrate certain radionuclides.

Experience has demonstrated that all actual and potential shellfish growing waters of the State must be classified as to their sanitary suitability for shellfish harvesting. Harvesting should be permitted only from those

24k areas which have been found by sanitary survey to meet the sanitary criteria of this manual. Harvesting should accordingly be specifically prohibited from areas which do not meet the criteria, or which have not been surveyed.

2. General Administrative Procedures To Be Used by States. -- States shall keep records which will facilitate Public Health Service review of their shellfish sanitation programs and shall assist the Service in making such reviews. States shall not certify shippers for interstate shipment unless the shipper complies substantially with the construction requirements of part II of this manual and maintains a sanitation rating of at least 80 percent during periods of operation. Shippers not meeting these requirements will not be eligible for inclusion on the Public Health Service list of State-certified shellfish shippers. National Program standards shall be applied to all actual and potential growing areas, all shellfish harvesters, and all persons handling shell stock prior to its delivery to the national program certified shipper. When two or more State agencies are involved in the sanitary control of the shellfish industry, a clear statement of responsibility of each agency should be developed.

Satisfactory compliance. -- This item will be satisfied when --

25k a. National Program requirements are applied to all actual and potential shellfish growing areas.

b. National Program requirements are applied to all commercial market shellfish harvesters.

c. National Program requirements are applied to all persons handling the shellfish prior to its delivery to the interstate shipper.

d. Interstate shellfish shipper certificates are issued only to those establishments substantially meeting the construction requirements of part II of this manual and which maintain a plant sanitation rating of at least 80 percent during periods of operations. (The State shellfish control agency shall suspend or revoke certificates if a plant sanitation rating drops below 80 percent or if any individual sanitation item is violated repeatedly.) Ratings will be determined on the basis of compliance with the applicable provisions of part II of this manual as measured by an inspection report comparable to that contained in appendix A of part II.

e. The following records are kept of shellfish sanitation activities as required in sections C, D, and E, Part I, of this manual and when monthly summaries of State patrol activities are forwarded to the Public Health Service regional office:

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(1) Individual growing area files. (Areas may be defined by either geographic or political boundaries.)

(2) Patrol activities, including arrests, prosecutions, and the results of prosecutions.

(3) Plant inspections. Shucker-packers and repackers shall ordinarily be inspected at least monthly. Shell stock shippers and reshippers shall be inspected at a frequency which will afford adequate public-health supervision of their operations. A central inspection-report file should be maintained by the State.

f. The following guidelines are observed by the State in issuing interstate shellfish certificates.

(1) Certificate content. Each certificate should give the following information:

Name. (The usual business name and alternative names that should appear on the interstate shellfish shippers list, hereafter called "list.")

Address. (A business and/or mailing address in the State issuing the certificate. This address indicates where records are kept and where inspection may be arranged.)

Certificate Number. (A number shall be assigned for each business unit. Suffix or prefix letters may not be used to differentiate between two or more plants of a given shipper.)

27.k Classification. (The shipper classification should be indicated by a symbol: i.e., shucker-packer, SP: repacker, RP; shell stock, SS; or reshipper, RS. Only one classification should be used. The single classification will cover all proposed operations which the shipper is qualified to perform.)

Expiration Date. (All certificates in a State should expire on the same date, preferably the last day of a month. This date will be shown on the "list". All certificates will be automatically withdrawn from the "list" on the date of expiration unless new certificates have been received by Public Health Service headquarters office. If the date of expiration coincides with the date of issue for the "list" the certificates expiring on the date of issue will be deleted.)

Certifying Officer. (Each certificate is signed by a responsible State official.)

(2) Certificate changes. A change in an existing, unexpired certificate should be made by issuing a corrected certificate.

(3) Interstate shipment before listing. The shipper should be informed of the probable date his name will appear on the "list" and should be advised against making interstate shipment prior to that date. (If shipments must

28k be made before the appearance of the shipper's name on the "list", the Public Health Service will notify the applicable receiving States if the names and addresses of the expected receivers are indicated in advance by the State when the certificate is forwarded to the Public Health Service.)

(4) State cancellation, revocation, or suspension of interstate shipper certificates. If a State revokes, cancels, or suspends an interstate shellfish shipper certificate, the Public Health Service regional office should be immediately notified, preferably by telephone or telegram, with a following confirmatory letter.

(5) Mailing list for interstate shellfish shipper list. Names of persons, business units, organizations, or agencies, desiring copies of the "list", and requests for information concerning the "list" should be sent to the appropriate Public Health Service regional office. Recipients will be circularized periodically to determine if they still have use for the "list".

g. The appropriate Public Health Service regional office is notified by the State of any revision in growing area classification. The notification shall so describe the area that it may be readily located on Coast and Geodetic Survey charts.

h. State shellfish plant inspectors are provided with the following inspection equipment: standardized inspection forms, thermometer, chlorine test kit, and light meter.

29k i. Interdepartmental memoranda of understanding have been developed which will define the responsibilities of each State agency in maintaining adequate sanitary control of the shellfish industry in the State.

Public-health explanation. -- The annual review of each participating State's shellfish sanitation activities is a fundamental Public Health Service responsibility in the National Program. The purpose of this review is to evaluate the adequacy and reliability of each individual State program in accord with the agreed-upon standards. The Service will endorse those State programs meeting the National Program standards and will publish and distribute a list of the names of the State certified shippers. However, if a State program does not meet the standards the program will not be endorsed. Names of nonparticipating States will be omitted from the Public Health Service list of State certified shellfish shippers.

Minimum plant sanitation standards for interstate shellfish shippers are described in part II of this manual. Experience has shown that absolute compliance with these minimum standards is not always attainable, particularly those items which relate to operating procedures. The establishment of the 80-percent plant sanitation score as a prerequisite for listing on the Public Health Service list of State certified shellfish shippers recognizes the fact that perfection is not always obtainable and, at the same time, provides a mechanism for excluding any plant which is not operated in a reasonably sanitary manner.

National program sanitary requirements should be applied to all actual and potential growing areas and all shellfish harvesters to insure that all shellfish available to certified dealers have been produced and harvested under sanitary conditions. It is also important that the shell stock be protected against contamination during the period between harvesting and delivery to the certified shipper.

3. Intrastate Sale of Market Shellfish. -- Sanitary standards for intrastate shellfish shippers should be substantially equivalent to those of the national program.

Public-health explanation. -- States may accept lower sanitary standards for shellfish sold intrastate than are required by the National Program. However, it has been found that small intrastate shippers may at times sell their product to interstate shippers if demand exceeds the supply of shellfish available to the latter. Because of the possibility that such substandard shellfish might be shipped interstate, the 1954 National Conference on Shellfish Sanitation recommended that National Program standards be applied

31k to all shellfish production and processing (1). The 1958 Shellfish Sanitation Workshop also strongly recommended the use of substantially equivalent standards for intra and inter-state shellfish shippers (3).

SECTION B

LABORATORY PROCEDURES

1. Bacteriological. -- American Public Health Association Recommended Procedures for the Examination of Sea Water and Shellfish shall be followed in the collection and transportation of samples of shellfish and shellfish waters for bacteriological examination and in the laboratory examination of such samples.[1]

Satisfactory compliance. -- This item will be satisfied when current American Public Health Association Recommended Procedures for the Examination of Sea Water and Shellfish are followed in the bacteriological examination of shellfish and shellfish waters.

Public-health explanation. -- Experience with the bacteriological examination of shellfish and shellfish growing waters has indicated that minor differences in laboratory procedures or techniques will cause wide

32k variations in the results. Variations in results may also be caused by improper handling of the sample during collection or transportation to the laboratory (10). The American Public Health Association Recommended Procedures for the Examination of Sea Water and Shellfish, which are revised periodically, offer a reliable way of minimizing these variations (62). (National Program required use of a standard procedure for the bacteriological examination of shellfish and shellfish waters should not discourage oratories from working on new methods of sample handling or analysis.)

2. Toxicological. -- A recognized procedure shall be used in the assay for paralytic shellfish poison.

Satisfactory compliance. -- This item will be satisfied when current Association of Official Agricultural Chemists official methods are followed in the bioassay for paralytic shellfish poison.

Public-health explanation. -- It has been demonstrated that significant variations in bioassay results will be caused by minor changes in procedures. If reliable results are to be obtained it is essential that the test procedures be standardized and that variations due to use of strains of mice be minimized (11). The official procedure for the bioassay for paralytic shellfish poison adopted

33k by the Association of Official Agricultural Chemists minimizes these variations (66). A method of analysis for ciguatera poison in shellfish has been developed (12).

3. Chemical and Physical. -- Standard laboratory methods shall be used for all salinity, radionuclide, and other chemical and physical determinations made on shellfish or shellfish waters in conjunction with National Program activities. Results shall be reported in standard units.

Satisfactory compliance.-- This item will be satisfied when --

a. Chemical and physical measurements on shellfish and shellfish waters are made in accord with accepted laboratory techniques.

b. Results of all chemical and physical determinations are expressed in standard units. (For example, salinity should be expressed in parts per thousand rather than hydrometer readings.)

Public-health explanation.-- Standardized laboratory procedures are most apt to produce results in which the State shellfish control agency can have confidence, and facilitate comparative evaluation of data. The need for adherence to standardized procedures should not discourage laboratories from experimental use of nonstandard methods.

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FOOTNOTES

Section B

[1] Material which may be useful in interpretation of results of bacteriological examination of shellfish is contained in appendix A.

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Section C

GROWING AREA SURVEY AND CLASSIFICATION

1. Sanitary Surveys of Growing Areas. -- A sanitary survey shall be made of each growing area prior to its approval by the State as a source of market shellfish or of shellfish to be used in a controlled purification or relaying operation. The sanitary quality of each area shall be reappraised at least biennially and, if necessary, a resurvey made. Ordinarily, resurveys will be made less comprehensive than the original survey since it will only be necessary to bring the original information up to date. Records of all original surveys and resurveys of growing areas shall be maintained by the State shellfish control agency, and shall be made available to Public Health Service review officers upon request.

Satisfactory compliance. -- This item will be satisfied when --

a. A sanitary survey has been made of each growing area in the State prior to initial approval of interstate shipments of shellfish from that area. A comprehensive sanitary survey shall include an evaluation of all sources of actual or potential pollution on the estuary and its tributaries, and the distance of such sources from the

36k growing areas; effectiveness and reliability of sewage treatment works, the presence of industrial wastes, pesticides, or radionuclides which would cause a public-health hazard to the consumer of the shellfish; and the effect of wind, stream flow, and tidal currents in distributing polluting materials over the growing area.[2] The thoroughness with which each element must be investigated varies greatly and will be determined by the specific conditions in each growing area.

b. The factors influencing the sanitary quality of each approved shellfish growing area are reappraised at least biennially.[3] A complete resurvey should be made of each growing area in an approved category at least once every ten years; however, data from original surveys can be used when it is clear that such information is still valid.

c. A file which contains all pertinent sanitary survey information, including the dates and results of preceding sanitary surveys is maintained by the State shellfish control agency for each classified shellfish area.

d. The State agency having primary responsibility for this element of the national program develops a system for identification of growing areas.

Public-health explanation. -- The positive relationship between sewage pollution of shellfish growing areas and enteric disease has been demonstrated many times (13) (14) (15) (16) (17) (18) (63) (64) (65). However, 37k epidemiological investigations of shellfish-caused disease outbreaks have never established a direct numerical correlation between the bacteriological quality of water and the degree of hazard to health. Investigations made from 1914 to 1925 by the States and the Public Health Service -- a period when disease outbreaks attributable to shellfish were more prevalent -- indicated that typhoid fever or other enteric disease would not ordinarily be attributed to shellfish harvested from water in which not more than 50 percent of the 1 cc. portions of water examined were positive for coliforms,[4] provided the areas were not subject to direct contamination with small amounts of fresh sewage which would not ordinarily be revealed by the bacteriological examination.

Following the oyster-borne typhoid outbreak during the winter of 1924-25 in the United States (19) the national shellfish certification program was initiated by the States, the Public Health Service, and the shellfish industry (9). Water quality criteria were then stated as:

a. The area is sufficiently removed from major sources of pollution so that the shellfish would not be subjected to fecal contamination in quantities which might be dangerous to the public health.

38k b. The area is free from pollution by even small quantities of fresh sewage. The report emphasized that bacteriological examination does not, in itself, offer conclusive proof of the sanitary quality of an area.

c. Bacteriological examination does not ordinarily show the presence of the coli-aerogenes group of bacteria in 1 cc. dilutions of growing area water.

The reliability of this three-part standard for evaluating the safety of shellfish-producing areas is evidenced by the fact that no major out-breaks of typhoid fever of other enteric disease have been attributed to shellfish harvested from waters meeting the criteria since they were adopted in the United States in 1925. Similar water quality criteria have been in use in Canada with like results. The available epidemiological and laboratory evidence gives little idea as to the margin of safety, but it is probably considerable as indicated by the virtual absence of reported shellfish caused enteric disease over a comparatively long period of time (18) (20) (21) (65) (69) from water meeting this criteria.

The purpose of the sanitary survey is to identify and evaluate those factors influencing the sanitary quality of a growing area and which may include sources of pollution, potential or actual, the volume of dilution water; the effects of currents, winds and tides in disseminating pollution over the growing areas; the bacterial quality of water and bottom sediments; die out of polluting bacteria in the tributaries and the estuary; bottom configuration; and salinity and turbidity of the water. Sources of pollution include municipal sewage discharged into the estuary or inflowing rivers; sewage brought into the estuary by tides or currents; surface runoff from polluted areas; industrial wastes; and discharges from pleasure craft, fishing boats, naval vessels, and merchant shipping.

Bacteriological examination of the growing waters is an important component of the sanitary survey. In many instances the bacteriological and related salinity data will also provide valuable information on the hydrographic characteristics of an area.[5 6]

Ideally, a large number of water samples for bacteriological examination should be collected at each station. However, in most instances this is not practical because of time and budget limitations, and accordingly only a limited number of samples can be collected. Therefore, sampling stations should be chosen which will provide a maximum of data, and which will be representative of the bacteriological quality of water in as wide an area as possible. Sample collection should be timed to represent the most

40k unfavorable hydrographic and pollution conditions since shellfish respond rapidly to an increase in the number of bacteria or viruses in their environment (25) (26) (70) (71) (72) (78).

There is no specified minimum number of sampling stations, frequency of sampling, or total number of samples. Sampling results obtained over a period of several years can be used as a block of data provided at least 15 samples have been collected from each of a representative number of stations along the line separating approved from restricted growing areas and there have been no adverse changes in hydrographic or sanitary conditions. Only occasional bacteriological samples are necessary from areas which are shown to be free from pollution.

Experience with the shellfish certification program indicates a tendency to omit or de-emphasize some components of the sanitary survey unless a central State file of all shellfish sanitary surveys, reappraisals, and resurveys is maintained. This is particularly true where responsibility for shellfish sanitation is divided between two or more State agencies. Maintenance of a central State file for all shellfish sanitary survey information will also simplify the endorsement appraisal of State programs by the Public Health Service and will help prevent

41k loss of old data which may be useful in evaluating the sanitary quality of an area.

Periodic reappraisals of the sanitary quality of shellfish producing areas are necessary to determine that environmental conditions are such that the original conclusions are still valid. A resurvey should be made within 1 year if the reappraisal shows a significant detrimental change.

2. Classification of Growing Areas. -- All actual and potential growing waters shall be classified as to their public health suitability for the harvesting of market shellfish. Classification criteria are described in sections C-3, C-4, C-5, C-6, and C-7 of this manual. Except in emergency any upward revision of an area classification shall be preceded by a sanitary survey, resurvey, or reappraisal. A written analysis of the data justifying the reclassification shall be made a part of the area file.

Satisfactory compliance. -- This item will be satisfied when --

a. All actual and potential growing waters in the State are correctly designated with one of the following classifications on the basis of sanitary survey information; Approved; conditionally approved; restricted; or prohibited.[7*]

42k b. Area classifications are revised whenever warranted by survey data.

c. Classifications are not revised upward without at least a file review, and there is a written record of such review in the area file maintained by the State shellfish control agency.

d. All actual and potential growing areas which have not been subjected to sanitary surveys shall be automatically classified as prohibited.

Public-health explanation. -- The probable presence or absence of pathogenic organisms in shellfish waters is of the greatest importance in deciding how shellfish obtained from an area may be used. All actual and potential growing waters should thus be classified according to the information developed in the sanitary survey. Classification should not be revised upward without careful consideration of available data. Areas should be reclassified whenever warranted by existing data. A written justification for the reclassification simplifies Public Health Service appraisal of State programs.

A hypothetical use of the four recognized area classifications is shown in figure 1. This idealized situation depicts an estuary receiving sewage from two cities, "A" and "B". City "A" has complete sewage treatment including chlorination of effluent. City "B" has no sewage

43k treatment. The estuary has been divided into five areas, designated by roman numerals, on the basis of sanitary survey information:

Approved

Area I. The sanitary survey indicates that sewage from cities "A" and "B" (even with the "A" sewage plant not functioning) would not reach this area in such concentration as to constitute a public-health hazard. The median coliform MPN of the water is less than 70/100 ml. The sanitary quality of the area is independent of sewage treatment at city "A".

Conditionally Approved

Area II. This area is of the same sanitary quality as area I; however, the quality varies with the effectiveness of sewage treatment at city "A". This area would probably be classified prohibited if city "A" had not provided sewage treatment.

Restricted

Area III. Sewage from "B" reaches this area, and the median coliform MPN of water is between 70 and 100 ml. Shellfish may be used only under specified conditions.

Prohibited

Area IV. Direct harvesting from this area is prohibited because of raw sewage from "B". The median

44k coliform MPN of water may exceed 700/100 ml.

Area V. Direct harvesting from this area is prohibited because of possible failure of the sewage treatment plant. Closure is based on need for a safety factor rather than coliform content of water or amount of dilution water.

3. Approved Areas. -- Growing areas may be designated as approved when: (a) the sanitary survey indicates that pathogenic micro-organisms, radionuclides, and/or harmful industrial wastes do not reach the area in dangerous concentration, and (b) this is verified by laboratory findings whenever the sanitary survey indicates the need. Shellfish may be taken from such areas for direct marketing.

Satisfactory compliance. -- This item will be satisfied when the three following criteria are met:

a. The area is not so contaminated with fecal material that consumption of the shellfish might be hazardous, and

b. The area is not so contaminated with radionuclides or industrial wastes that consumption of the shellfish might be hazardous (see Section C, item 7, regarding toxins in shellfish growing areas), and

c. The coliform median MPN of the water does not exceed 70 per 100 ml., and not more than 10 percent of the

45k samples ordinarily exceed an MPN of 230 per 100 ml. for a 5-tube decimal dilution test (or 330 per 100 ml., where the 3-tube decimal dilution test is used) in those portions of the area most probably exposed to fecal contamination during the most unfavorable hydrographic and pollution conditions. (Note: This concentration might be exceeded if less than 8 million cubic feet of a coliform-free dilution water are available for each population equivalent (coliform) of sewage reaching the area). The foregoing limits need not be applied if it can be shown by detailed study that the coliforms are not of direct fecal origin and do not indicate a public health hazard (19) (20).[8]

Public-health explanation. -- A review of epidemiological investigations of disease outbreaks attributable to the consumption of raw shellfish reveals that two general situations prevail[9] insofar as pollution of growing or storage areas are concerned.

(1) Gross sewage contamination of a growing or wet storage area. (A report of a 1910 outbreak of typhoid fever involving 41 persons notes that raw sewage from a city with a population of 30,000 was discharged only a few hundred feet away from clam beds and floats (27) (28). In 1947 a case of typhoid fever was attributed to clams harvested 200 yards from the outlet of a municipal sewage treatment plant (29). In the latter case, the coliform MPN of the harbor water

46k exceeded 12,000 per 100 ml. and the area had been posted as closed to shellfish harvesting.)

(2) Chance contamination of a growing or wet storage area by fresh fecal material which may not be diffused throughout the entire area (14) (16) (17) (19) and therefore not readily detectable by ordinary bacteriological procedures. The possibility of chance contamination was noted by Dr. Gurion in his report on a 1902 typhoid outbreak, and who is quoted in Public Health Bulletin No. 86, as "there is a zone of pollution established by the mere fact of the existence of a populated city upon the banks of a stream or tidal estuary which makes the laying down of oysters and clams in these waters a pernicious custom if persisted in, because it renders these articles of food dangerous at times, and always suspicious". The 1956 outbreak of infectious hepatitis in Sweden (691 cases) attributed to oysters which were contaminated in a wet storage area is an example of such contamination (16). Similarly in 1939, 87 cases of typhoid were attributed to fecal contamination of a storage area by a typhoid carrier (14).

It is well established that shellfish from water having a median coliform MPN not exceeding 70 per 100 ml.[8] and which is also protected against chance contamination with fecal material, will not be involved in the spread of

47k disease which can be attributed to initial contamination of the shellfish. This is not surprising since a water MPN of 70/100 ml. is equivalent to a dilution ratio of about 8 million cubic feet of coliform-free water per day for the fecal material from each person contributing sewage to the area. This tremendous volume of water is available in shellfish growing areas through tidal action which is constantly bringing unpolluted water into the area.[8]

Areas which are approved for direct market harvesting of shellfish which will be eaten raw must necessarily meet one general test; i.e., sewage reaching the growing area must be so treated, diluted, or aged that it will be of negligible public-health significance. This implies an element of time and distance to permit the mixing of the sewage or fecal material with the very large volume of diluting water and for a major portion of the microorganisms to die out. Studies of the natural die-off of microorganisms in an unfavorable marine environment have been summarized by Greenberg (22).

The effectiveness of sewage treatment processes must be considered in evaluating the sanitary quality of a growing area since the bacterial and viral content of the effluent will be determined by the degree of treatment which is obtained (2) (73) (74) (75). The results of

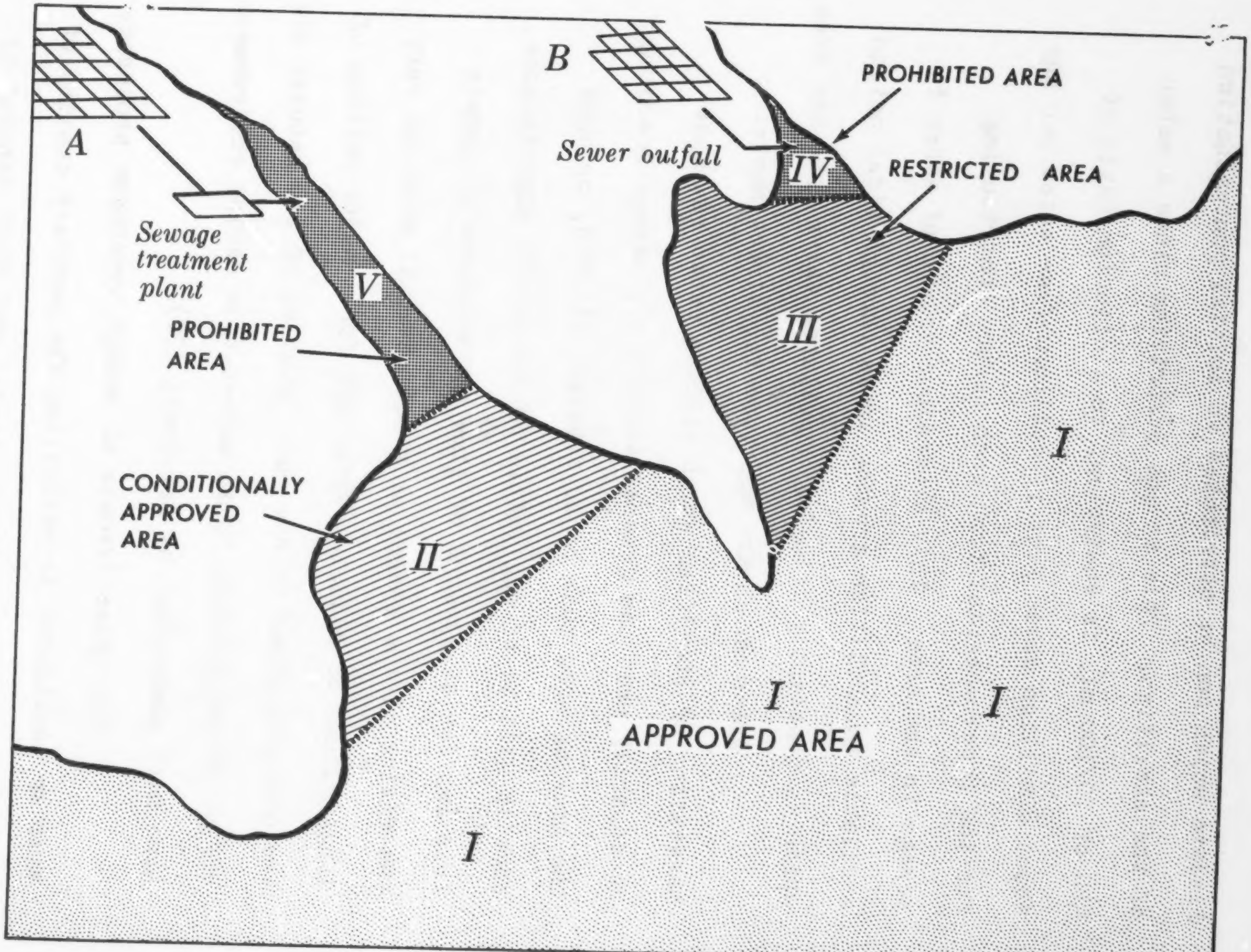
A
B
Sewage treatment plant
Sewer outfall
PROHIBITED AREA
RESTRICTED AREA
PROHIBITED AREA
CONDITIONALLY APPROVED AREA
APPROVED AREA
I
I
I
I
II
III
IV
V

FIGURE 1

9k bacteriological sampling must also be correlated with sewage treatment plant operation, and evaluated in terms of the minimum treatment which can be expected with a realization of the possibility of malfunctioning, overloading, or poor operation.

The presence of radionuclides in growing area waters may also have public-health significance since shellfish, along with other marine organisms, have the ability to concentrate such materials (31) (32) (33) (34). The degree to which radioisotopes will be concentrated depends upon the species of shellfish and the specific radioisotope. For example, it has been reported that the Eastern oyster has a concentration factor of 17,000 for Zn^{65} whereas the concentration factor in soft tissues for Sr^{89} is approximately unity (31) (33). The distribution of the radioisotope in the shellfish and the biological half-life are also variable. Sources of radioactive materials include fall-out, industrial wastes, and nuclear reactors. Limiting maximum permissible concentrations of radioactive materials expressed in terms of specific radioisotopes and unidentified mixtures in water and food have been established (35) (36). The current standard should be consulted in evaluating the public-health significance of detected radioactivity in market shellfish.

50k The bacterial quality of active shellfish will ordinarily be directly proportional to the bacterial quality of the water in which they grew; however, considerable variation in individual determinations may be expected. The coliform MPN's of the shellfish usually exceed those of the overlying water because shellfish filter large quantities of water to obtain food, thereby concentrating the suspended bacteria. This relationship will depend upon the shellfish species, water temperature, presence of certain chemicals, and varying capabilities of the individual animals.

4. Conditionally Approved Areas. -- The suitability of some areas for harvesting shellfish for direct marketing is dependent upon the attainment of an established performance standard by sewage treatment works discharging effluent, directly of indirectly, to the area. In other cases the sanitary quality of an area may be effected by seasonal population, or sporadic use of a dock or harbor facility. Such areas may be classified as conditionally approved.

State shellfish control agencies shall establish conditionally approved areas only when satisfied that (a) all necessary measures have been taken to insure that performance standards will be met, and (b) that precautions have been taken to assure that shellfish will not be marketed from the areas subsequent to any failure to meet the performance standards and before the shellfish can purify themselves of polluting microorganisms.

Satisfactory compliance. -- This item will be satisfied when --

a. The water quality requirements for an approved area are met at all times while the area is approved as a source of shellfish for direct marketing.

b. An operating procedures for each conditionally approved area is developed jointly by the State shellfish control agency, local agencies, including those responsible for operation of sewerage systems, and the local shellfish industry. The operating procedure should be based on an evaluation of each of the potential sources of pollution which may affect the area. The procedure should establish performance standards, specify necessary safety devices and measures, and define inspection and check procedures. (These procedures are described in more detail in the following public-health explanation.)

c. A closed safety zone is established between the condionally approved area and the source of pollution to give the State agency time to stop shellfish harvesting if performance standards are not met.

d. Boundaries of conditionally approved areas are so marked as to be readily identified by harvesters.

52k e. Critical sewerage system units are so designed, constructed, and maintained that the chances of failure to meet the established performance standards due to mechanical failure or overloading are minimized.

f. There is a complete understanding of the purpose of the conditionally approved classification by all parties concerned, including the shellfish industry. Successful functioning of the concept is dependent upon the wholehearted cooperation of all interested parties. If such cooperation is not assured the State should not approve the area for direct harvesting of market shellfish.

g. Any failure to meet the performance standards is immediately reported to the State shellfish control agency by telephone or messenger. In some instances states may find it desirable to delegate the authority for closing a conditionally approved area to a representative of the agency located in the immediate area.

h. The State immediately closes conditionally approved areas to shellfish harvesting following a report that the performance standards have not been met. The area shall remain closed until the performance standards can again be met plus a length of time sufficient for the shellfish to purify themselves so that they will not be a hazard to the public health. (See section D-1, "Relaying," for information on the length of time required for self-purification of shellfish.)

53k i. The State shellfish control agency makes at least two evaluations during the shellfish harvesting season of each conditionally approved area including inspection of each critical unit of the sewerage system to determine the general mechanical condition of the equipment, the accuracy of recording devices, and the accuracy of reporting by the operating agency.

j. It is discovered that failure to meet performance standards have not been reported by the operating agency, or if the performance standards are not met, the area will immediately revert to a restricted or prohibited classification.

k. All data relating to the operation of a conditionally approved area, including operation of sewerage systems, are maintained in a file by the State shellfish control agency.

Public-health explanation. -- The conditionally approved classification is designed primarily to protect shellfish growing areas in which the water quality might undergo a significant adverse change within a short period of time.[10] The change might result from overloading or mechanical failure of a sewage treatment plant, or bypassing of sewage at a lift station.

54k Water quality in many growing areas in the more densely populated sections of the country is, to some degree, dependent upon the operation of sewage treatment plants. For example, the boundaries of an approved shellfish area might be determined during a period when a tributary sewage treatment plant is operating at a satisfactory level. If there is some interruption in treatment it follows that there will be some degradation in water quality in the growing area, which may justify a relocation of the boundaries. The degree of relocation would depend upon such items as the distance between the pollution source and the growing area, hydrography, the amount of dilution water, and the amount of pollution.

The concept is also applicable to other situations in which there may be a rapid or seasonal change in water quality. Examples of such situations include --

a. A growing area adjacent to a resort community. During the summer months the community might have a large population which might have an adverse effect on water quality. However, during the winter when there are few people in the community the water quality might improve sufficiently to allow approval of the area. In some States this is known as a seasonal closure.

b. A protected harbor in a sparsely settled area might

55k provide anchorage for a fishing fleet several months a year. When the fishing fleet is in, the harbor water would be of poor sanitary quality; however, during the remainder of the year the quality of the harbor water might be satisfactory. The area would be approved for shellfish harvesting only when the fishing fleet is not using the harbor.

c. The water quality in an area fluctuates with the discharge of a major river. During periods of high runoff the area is polluted because of decreased flow time in the river. However, during periods of low runoff the area might be of satisfactory quality and thus be approved for shellfish harvesting.

The establishment of conditionally approved areas might be considered whenever the potential for sewage contamination is such that the limiting water quality criteria for an approved area might be exceeded in less than one week due to a failure of sewage treatment, or other situations as described above. The first step in determining whether an area should be placed in the conditionally approved classification is the evaluation of the potential sources of pollution in terms of their effect on water quality in the area. Potential sources of pollution include the following:

56k

(1) Sewage treatment plants.

(a) Bypassing of all or part of sewage because of mechanical or power failure, hydraulic overloading, or treatment overloading.

(b) Reduced degree of treatment due to operational difficulties or inadequate plant.

(2) Sewage lift stations.

(a) Bypassing during periods of maximum flow due to inadequate capacity.

(b) Bypassing because of mechanical or power failure.

(3) Interceptor sewers or underwater outfalls.

(a) Exfiltration due to faulty construction

(b) Leakage due to damage.

(4) Other sources of pollution.

(a) Sewage from merchant or naval vessels.

(b) Sewage from recreation use of area.

The second step in establishment of a conditionally approved area is the evaluation of each source of pollution in terms of the water quality standards to be maintained, and the formulation of performance standards for each installation having a significant effect on the sanitary quality of the area. Examples of performance standards might include:

(1) Bacteriological quality of effluent from sewage

57k treatment plants. This might be stated in terms of chlorine residual if the bacteriological quality of the effluent can be positively related to chlorine residual. The following is an example of a performance standard (37): "The median coliform MPN, in any one month, shall not exceed 500 per 100 ml., based on not less than 16 composite samples per month, and not more than 10 percent of the samples shall have an MPN in excess of 10,000 per 100 ml. Determinations of the chlorine residual of the effluent should be made hourly and recorded in the permanent plant records."

(2) Total quantity of sewage which can be discharged from any given unit, or from a combination of units, without causing the basic water quality standards to be exceeded.

(3) Amount of shipping in the area and the amount of sewage which can be expected.

Design criteria which may be useful in formulating an opinion on the quantity of sewage which can be discharged into an area without exceeding the desired water quality standards include: Population equivalent (coliform) of sewage; predicted survival of coliform in sea water, effectiveness of chlorination, and the total quantity of clean dilution water in an area. Results of many studies on the survival of bacteria in sea water have been summarized

58k in An Investigation of the Efficacy of Submarine Outfall Disposal of Sewage and Sludge; Publication No. 14, California State Water Pollution Control Board, 1956.

The mechanical equipment at critical sewage treatment or pumping units should be such that interruptions will be minimized. Wherever possible operations should be automatically recorded on charts. Examples of the requirements which might be imposed, depending upon the importance of the unit in terms of water quality, include

(1) Ample capacity for storm flows. (Storm water should ordinarily be excluded from the sanitary system.)

(2) Standby equipment to insure that treatment or pumping will not be interrupted because of damage to a single unit or to power failure.

(3) Instrumentation of pumps and equipment to allow the regulatory agency to determine that performance standards have been met. Examples include:

(a) Recording scales to indicate rate of chlorine use. Chlorine flow can be integrated with hydraulic flow to establish a ratio.

(b) Liquid level recording gages in overflow channels of sewage treatment plants and wet wells of lift stations to indicate when overflow takes place. Charts should be dated and initialed by the operator. Gages should be calibrated so that discharge can be estimated.

59k (c) Automatic devices to warn of failure or malfunctioning at self-operated pumping stations or treatment plants.

(4) The effect of storm sewage can be calculated by multiplying the total estimated flow by the observed coliform content. The result can be expressed in terms of population equivalents (coliform).

Design and operation of equipment should be such that closure provisions should not have to be invoked more than once per year under ordinary circumstances.

A closed safety area should be interposed between the conditionally approved area and the source of pollution. The size of such area should be based on the total time it would take for the operating agency to detect a failure, notify the State shellfish control agency, and for the latter agency to stop shellfish harvesting. It is recommended that the area be of such size that the flow time through the safety area be at least twice that required for the notification process to become effective. Due consideration should be given to the possibility that closure actions might be necessary on holidays or at night.

The type of marking which will be required for conditionally approved areas will vary from state to

60k state depending upon the legal requirements for closing an area.

The length of time a conditionally approved area should be closed following a temporary closure will depend upon several factors including the species of shellfish, water temperature, purification rates, presence of silt or other chemicals that might interfere with the physiological activity of the shellfish, and the degree of pollution of the area. (See section D-1 of this manual for additional information on the natural purification of shellfish.)

5. Restricted Areas. -- An area may be classified as restricted when a sanitary survey indicates a limited degree of pollution which would make it unsafe to harvest the shellfish for direct marketing. Alternatively the states may classify such areas as prohibited. (See section C-6, this manual.) Shellfish from such areas may be marketed after purifying or relaying as provided for in section D.

Satisfactory compliance. -- This item will be satisfied when the following water quality criteria are met in areas designated by states as restricted.[11] [12]

a. The area is so contaminated with fecal materials that direct consumption of the shellfish might be hazardous, and/or

61k b. The area is not so contaminated with radionuclides or industrial wastes that consumption of the shellfish might be hazardous, and/or

c. The coliform median MPN of the water does not exceed 700 per 100 ml. and not more than 10 percent of the samples exceed an MPN of 2,300 per 100 ml. in those portions of the areas most probably exposed to fecal contamination during the most unfavorable hydrographic and pollution conditions. (Note: this concentration might be exceeded if less than 800,000 cubic feet of a coliform-free dilution water are available for each population equivalent (coliform) of sewage reaching the area.)

d. Shellfish from restricted areas are not marketed without controlled purification or relaying.

Public-health explanation. -- In many instances it is difficult to draw a clear line of demarcation between polluted and nonpolluted areas. In such instances the state may, at its option, classify areas of intermediate sanitary quality as restricted and authorize the use of the shellfish for relaying, or controlled purification.

6. Prohibited Areas. -- An area shall be classified prohibited if the sanitary survey indicates that dangerous numbers of pathogenic microorganisms might reach an area. The taking of shellfish from such areas for direct marketing shall be prohibited. Relaying or

62k other salvage operations shall be carefully supervised to insure against polluted shellfish entering trade channels. Actual and potential growing areas which have not been subjected to sanitary surveys shall be automatically classified as prohibited.

Satisfactory compliance. -- This item will be satisfied when:

a. An area is classified as prohibited if a sanitary survey indicates either of the following degrees of pollution:

(1) The area is contaminated with radionuclides or industrial wastes that consumption of the shellfish might be hazardous and/or

(2) The median coliform MPN of the water exceeds 700 per 100 ml. or more than 10 percent of the samples have a coliform MPN in excess of 2,300 per 100 ml. (Note: This concentration might be reached if less than 800,000 cubic feet of a coliform-free dilution water are available for each population equivalent (coliform) of sewage reaching the area.)

b. No market shellfish are taken from prohibited areas except by special permit as described in section D.

c. Coastal areas in which sanitary surveys have not been made shall be automatically classified as prohibited.

63k Public-health explanation. -- The positive relationship between enteric disease and the eating of raw or partially cooked shellfish has been outlined in section C-1. Prevention of the interstate transport of shellfish containing sufficient numbers of pathogenic microorganisms to cause disease is a primary objective of the National Program. Therefore, areas containing dangerous concentrations of microorganisms of fecal origin, or areas which may be slightly contaminated with fresh fecal discharges, should not be approved as a source of shellfish for direct marketing.

7. Closure of Areas Due to Shellfish Toxins. -- The State shellfish control agency shall regularly collect and assay representative samples of shellfish from growing areas where shellfish toxins are likely to occur. If the paralytic shellfish poison content reaches 80 micrograms per 100 grams of the edible portions of raw shellfish meat, the area shall be closed to the taking of the species of shellfish in which the poison has been found.[13] The harvesting of shellfish from such areas shall be controlled in accord with the recommendations of sections E-1 and E-2 of this manual.

The quarantine shall remain in effect until such time as the State shellfish control agency is convinced the poison content of the shellfish involved is below the

64k quarantine level.[14]

Satisfactory compliance. -- This item will be satisfied when --

a. The State shellfish control agency collects and assays representative samples of shellfish for the presence of toxins from eash suspected growing area during the harvesting season. (See section B-2 for assay methods.)

b. A quarantine is imposed against the taking of shellfish when the concentration of paralytic shellfish poison equals or exceeds 80 micrograms per 100 grams of the edible portion of raw shellfish.

Public-health explanation. -- In some areas paralytic poison is collected temporarily by bi-valve shellfish from free-swimming, one-celled marine plants on which these shellfish feed. The plants flourish seasonally when water conditions are favorable.

Cases of paralytic poisoning, including several fatalities, resulting from poisonous shellfish have been reported from both the Atlantic and Pacific coasts. The minimum quantity of poison which will cause intoxication in a susceptible person is not know. Epidemiological investigations of paralytic shellfish poisoning in Canada have indicated 200 to 600 micrograms of poison will produce symptoms in susceptible persons and a death has been

65k attributed to the ingestion of a probable 480 micrograms of poison. Investigations indicate that lesser amounts of the poison have no deleterious effects on humans. Growing areas should be closed at a lower toxicity level to provide an adequate margin of safety since in many instances toxicity levels will change rapidly (38) (39). It has also been shown that the heat treatment afforded in ordinary canning processes reduces the poison content of raw shellfish considerably.

A review of literature and research dealing with the source of the poison, the occurrence and distribution of poisonous shellfish, physiology and toxicology, characteristics of the poison, and prevention and control of poisoning has been prepared (40).

In Gulf coast areas, toxicity in shellfish has been associated (12) (76) with Red Tide outbreaks caused by mass bloomings of the toxic dinoflagellate, Gymnodinium breve. Toxic symptoms in mice suggest a type of ciguatera fish poisoning rather than symptoms of paralytic shellfish poisoning.

FOOTNOTES

Section C

[2] In making the sanitary survey consideration should be given the the hydrographic and geographic characteristics of the estuary, the bacteriological quality of the growing area water and bottom sediments, and the presence and location of small sources of pollution, including boats, which might contribute fresh sewage to the area.

[3] The purpose of this reappraisal is to determine if there have been changes in stream flow, sewage treatment, populations, or other similar factors which might result in a change in the sanitary quality of the growing area. The amount of field work associated with such a reappraisa will depend upon the area under consideration and the magn tude of the changes which have taken place.

[4] An MPN of approximately 70 per 100 ml.

[5] Bacteria in an unfavorable environment die out in such a way that following an initial lag period there is a large percentage decline during the first few days.

Descriptions of studies on bacteria dieout have been published by Greenberg (22) and Pearson (23). Dieoff has also been investigated by the Public Health Service Shellfish Sanitation Laboratory at Woods Hole, Mass., and Pensacola, Fla. Application of this principle may be helpful in predicting the quantity of pollution which will reach an area, and in establishing objective effluent quality criteria (24).

6
In connection with the evaluation of sampling results, it should be noted that MPN determination is not a precise measure of the concentration of bacteria (4). Thus, in repeated sampling from waters having a uniform density of bacteria varying MPN estimates will be obtained. The use of the tolerance factor 3.3 (applicable only to 5 tube decimal dilution MPN's) is one method of recognizing this variation. For example, in a body of water in which the median concentration of coliform bacteria is 70 per 100 ml., 95% of observed MPN's will be between 20 and 230 per 100 ml.; i.e., 70/3.3 = 21 and 70 x 3.3 = 230.

7
Closures may also be based on presence of Marine Toxins or other toxic materials.

68k

[*] States may use other terminology in describing area classifications; provided, that the classification terms used are consistent with the intent and meaning of the words "approved", "conditionally approved", "restricted", or "prohibited".

[8] This MPN value is based on a typical ratio of coliforms to pathogens and would not be applicable to any situation in which an abnormally large number of pathogens might be present. Consideration must also be given to the possible presence of industrial or agricultural wastes in which there is an atypical coliform to pathogen ratio (30)

[9] There is a third general consideration in which shellfish may be contaminated through mishandling. This is not related to growing area sanitation and is considered in part II of this manual.

[10] A natural disaster may also cause many sewage treatment plants to be out of service for an extended period of time. The conditionally approved area concept is not ordinarily concerned with such emergency situations.

59k

[11] It is not mandatory that states use this classification. Areas not meeting the approved classification may be closed to all harvesting for direct marketing.

[12] Routine sanitary surveys and reappraisals of restricted areas shall be made on the same frequency as for approved areas. (See section C-1.)

[13] This value is based on the results of epidemiological investigations of outbreaks of paralytic shellfish poison in Canada in 1954 and 1957 (38) (39).

[14] The provisions of this item apply only to shellfish which will be marketed as a fresh or frozen product as properly controlled heat processing will reduce the poison content of the shellfish.

70k

Section D

PREPARATION OF SHELLFISH FOR MARKETING

1. Relaying. -- State shellfish control agencies may approve the intra- or interstate transplanting of market shellfish from restricted or prohibited areas to approved areas subject to certain limitations. All phases of the operation shall be under the immediate supervision of responsible State(s) shellfish control or patrol agency(s). A memorandum of understanding shall be developed between the agencies responsible for the control of interstate relaying operations. (Shellfish may be transplanted from an approved area to another like area at any time without restriction due to sanitary reasons.)

Satisfactory compliance. -- This item will be satisfied when --

a. Shellfish are not relaid from restricted or prohibited areas to approved areas without written permission of the State shellfish control agency.

b. All relaying operations are under the immediate supervision of the State shellfish control or patrol agency. Supervision shall be such that no polluted shellfish are marketed before the end of the approved relaying period. The supervising officer shall be authorized and equipped to enforce the State regulations on relaying; shall actually supervise the harvesting, transport and relaying of shellfish; and shall patrol the approved area during the period that shellfish are undergoing the cleansing process. However, continuous supervision will not be necessary if relaying operations are carried out during a period when shellfish may not be marketed. A continuous record of water temperature, salinity, and any other critical variables must be maintained when it is known that the limiting values may be approached and when the minimum relaying periods are being used.

c. State permission to relay shellfish is given only to responsible persons; responsibility to be determined by the past record of the permit applicant.

d. Relaid shellfish are held in the approved area for a period of time sufficient to allow them to cleanse themselves of polluting bacteria. (The time required for purification will be determined by water temperature, salinity, initial bacteriological quality and species of shellfish.)

e. Relaid shellfish are not harvested without written permission from the State shellfish control agency.

f. Areas designated for relaid shellfish are so

72k located and marked that they may be readily identified by the harvesters and so that shellfish in any adjacent approved area will not be contaminated. (This requirement applies only to relaying during the harvesting season.)

g. Shellfish are not relayed intra or interstate from restricted or prohibited areas to approved areas without written permission of the State(s) shellfish control agency (s). (If shellfish are relayed interstate, a memorandum of agreement shall be developed outlining the control measures to be used.)

Public-health explanation. -- Shellfish transplanted from a polluted to a clean environment will cleanse themselves of the polluting bacteria or viruses. This is a natural phenomenon resulting from the shellfish feeding processes. Bacteria or viruses in the body and shell cavity of the shellfish at the time of transplanting are either used as food or are ejected in feces or pseudofeces.

The length of time required for this cleansing process is influenced by many factors including original level of pollution, water temperature, presence of chemicals inhibitory to physiological activity of the shellfish, salinity, and varying capabilities of the individual animals.

73k Advice on limiting water temperatures, either maximum or minimum, should be obtained from local marine biologists.

Investigations by marine biologists have confirmed that the psysiological activities of the Eastern oyster (Crassostrea virginica) is reduced when the water temperature falls below a certain value. It has been found that the pumping rate of Eastern oysters is reduced at water temperatures below 50° F., and that most animals stop pumping at a water temperature of about 41° F. However, a few oysters show slight activity at temperatures approaching 32° F. (41) (42). This phenomenon was first noted by shellfish bacteriologists who found that Eastern oysters harvested from polluted areas during cold weather had coliform contents comparable with those of oysters harvested from clean areas during warmer weather (43) (44) (45).

Gibbard et al. (46) investigating temperature-induced hibernation was unable to demonstrate coliforms in Eastern oysters within a few days after the water temperatures dropped to 32° F. The rapidity with which hibernating oysters become active when the water temperature rises above the threshold value was discussed by Wachter (47) in 1925 and was demonstrated by Gibbard et al. (46). The latter investigator found that contamination accompanying a sudden two degree increase in water temperature from 41° to 43° F. was reflected in the oysters in one day.

Relaying operations must be carefully supervised by an official State agency since the shellfish may contain pathogenic microorganisms. Control must apply to all phases of the operation including initial harvesting, transportation, replanting, purification period, and final harvesting for marketing if the relaying area is adjacent to a restricted area or to an area containing relaid shellfish which have not been released for harvesting.

Controlled Purification. -- Shellfish from restricted or prohibited areas may be marketed after effective controlled purification. Purification shall be permitted only under the immediate supervision of the State shellfish control agency. Water used for purification shall be of high bacteriological quality and its physical and chemical properties shall be favorable to maximum physiological activity of the shellfish. Stringent precautions shall be taken by the State shellfish control agency to insure that shellfish harvested from restricted or prohibited areas are actually submitted to an effective purification process before marketing.

Purification of shellfish from prohibited areas shall not be approved by the State unless relaying is not practical for biological reasons, and no public-health hazard will result from the use of such shellfish.

Satisfactory compliance. -- This item will be satisfied when:

a. The controlled purification system, including water treatment, has been demonstrated to be consistently effective for the species of shellfish being purified. Purification may be accomplished in either a natural body of water or in tanks. (In determining the effectiveness of the process at least the following factors shall be investigated: Water temperature, silt or turbidity, dissolved oxygen, presence of chemicals, and time required for purification.) The bacteriological quality of the purified shellfish shall be at least equal to shellfish of the same species harvested from local approved areas.

b. A purification plant operating procedures is developed and copies are supplied to the Public Health Service.

c. Water used for purification is obtained from an area meeting the physical and bacteriological requirements of an approved growing area, or in the case of treated water the bacteriological limits of the Public Health Service Drinking Water Standards (48) are met. If water is to be treated, it shall be obtained from an area meeting at least the sanitary requirements for a restricted area.

d. Water used for purification has chemical and physical characteristics conducive to maximum physiological activity of the shellfish. (Consideration shall be given to the following: Presence of chemicals, turbidity, temperature, salinity and dissolved oxygen, and to to the adequacy of the facilities of the operating agency for measuring these characteristics.)

e. Shellfish are freed of contamination and foreign material adhering to shells before purification.

f. Shellfish are culled before and after purification.

g. Purification plant operation is under the administrative control of the State shellfish control agency. Purification plants may be operated by agencies other than the State; however, insofar as the National Shellfish Sanitation Program is concerned, the State is responsible for satisfactory operation.

h. Laboratory control is maintained over the purification operation. Controls shall include at least the following: Daily or tidal-cycle bacteriological quality of water; final bacteriological quality for each lot of shellfish purified; and, when they are critical factors, hourly or continuous salinity determinations and tidal-cycle turbidity determinations.

i. The plant operator possesses a satisfactory knowledge of the principles of water treatment and bacteriology.

j. Animals, rodents, and unauthorized persons are excluded from the plant.

k. Plant employees fulfill the qualifications for a shucker as described in section B-28, part II of this manual.

l. The State has an effective system for assuring that shellfish harvested from restricted areas will be submitted to purification before marketing. Shellfish harvesting from prohibited areas for controlled purification shall be under the immediate supervision of the State.

m. Shellfish from prohibited areas are not subjected to purification unless the State shellfish control agency can show that relaying or depletion is not biologically feasible; and that no public-health hazard will result from the use of such shellfish.

Public-health explanation. -- The ability of shellfish to purify themselves in clean water was discovered early in the 1900's. The biological process is reasonably well understood and is described by Arcisz and Kelly (26) as follows:

"Purification is a mechanical process effected by the physiological functioning of the shellfish in clean water. When shellfish are feeding, the gills act as a filter to strain out some of the material that may be brought in by the water which passes through them. If this water contains sewage, some of the microorganisms in it are entrapped in the mucus on the body of the shellfish and transferred to the alimentary tract. Some of these are perhaps utilized as food (49) and the others discharged from the body in the form of feces and pseudofeces. When shellfish from polluted water are placed in clean water, the sewage bacteria are eliminated from the shellfish, and, since no more are ingested, purification is accomplished."

The purification process has been investigated extensively in England and to a lesser extent in the United States and Canada (50) (51) (52). The technique is reliable if proper methods are used, and insofar as is known, is applicable to all commercial species of shellfish.

Many of the earlier investigators suggested that purification be accomplished in tanks using water which had been subjected to a treatment process (52). The analogy with water treatment was carried to the point of recommending a chlorine residual in the purification tanks. However, fishery biologists have shown that shellfish pumping is decreased or inhibited by even small quantities of chlorine (53) (54). The inhibitory effect of chlorinated-dechlorinated water on activity of Eastern oysters has been noted by the Public Health Service Shellfish Sanitation Laboratory.

Since purification depends upon the pumping rate of the shellfish, it is important that the water be free of chemicals or physical characteristics which might interfere with this activity. For example, silt or dissolved organic substances may influence the pumping rates of shellfish (55) (56). The relationship of water temperature to pumping rates has been mentioned previously.

Shellfish purification facilities have generally been considered to include holding tanks and water treatment facilities (57) (58); however, investigations in Canada and England have demonstrated that purification can be accomplished with relatively simple installations if the operation is supervised properly (59) (50) (60) (61). Accordingly, any purification process of proven effectiveness will be accepted by the national program.

Administrative control of the purification process is necessary to insure that shellfish are properly washed and culled, are held for the required length of time, and that the purification water supply is properly controlled.

Section E

CONTROL OF HARVESTING FROM CLOSED AREAS

1. Identification of Closed Areas. -- Shellfish harvesters shall be notified by direct notice and warning signs of areas closed to harvesting. Closed areas shall be so marked or described that they may be easily recognized by the harvesters. The measures necessary to accomplish delineation and notification will vary with the structure of the local shellfish industry and with the legal requirements of each State.

Satisfactory compliance. -- This item will be satisfied when:

a. The boundaries of the closed areas are marked by fixed objects or landmarks in a manner which permits successful prosecution of any violations of the closed areas.

b. Shellfish harvesters are notified of the location of closed areas by publication or direct notification (such as registered mail) and/or warning signs posted at points of access to each closed area. The method of notification and identification should permit the successful prosecution of persons harvesting shellfish from the closed areas.

(The limiting of shellfish harvesting permits to specific areas is an alternative to posting or notification. Where such a system is used, posting will be required only for closed areas which contain market shellfish.)

Public-health explanation. -- Previous sections of this manual have described the public-health reasons for limiting shellfish harvesting to areas free of contamination and shellfish toxins. Methods have been described for the evaluation and classification of such areas. However, classification is not effective unless the State can prevent illegal harvesting of shellfish for direct marketing from these closed areas.

For the most part, control of illegal harvesting depends upon the police activities as described in section E-2. However, adequate delineation of the closed areas is fundamental to effective patrol.

The type of area identification will be determined by the structure of the local shellfish industry. Posting a warning sign is one method of informing shellfish harvesters that an area is closed to the taking of shellfish for public-health reasons. However, if the local shellfish industry is highly organized, with shellfish being harvested by only a few operators, identification may be accomplished by officially informing the harvesters that certain areas are closed to the taking of shellfish. It is recommended that the advice of the State's legal counsel be obtained to insure that the marking of closed areas and notifications to shellfish harvesters are such that illegal harvesting can be prosecuted successfully.

2. Prevention of Illegal Harvesting of Shellfish From Closed Areas. -- Closed growing areas shall be patrolled by a State agency to prevent illegal harvesting. The patrol force shall be so equipped that its officers will be able to apprehend persons taking shellfish from closed areas.

Satisfactory compliance. -- This item will be satisfied when --

a. There is no evidence that shellfish are being harvested from closed areas except by special permit as required to meet local conditions.

b. Closed shellfish growing areas are patrolled by representatives of an official agency, due consideration being given to night, weekend and holiday patrols. (States may delegate patrol activities to local organizations; however, responsibility for effective control will remain with the State insofar as the National Program is concerned.

c. Patrol forces are so equipped that persons observed in closed areas may be apprehended.

d. Complete records of patrol activities, including violations and court actions, are maintained in the central office of the State shellfish control or patrol agency. It will be the responsibility of the State to include local patrol activities in these records. (See section A, subsection 2 (e) regarding monthly summaries of patrol activities.)

Public-health explanation. -- The primary objective of the National Program is to insure that shellfish will be harvested only from areas which are free of dangerous concentrations of pathogenic microorganisma, industrial or radioactive wastes, pesticides or shellfish toxins.

Growing areas may be classified as to their public-health suitability for shellfish harvesting on the basis of information obtained by sanitary and toxicological surveys. However, if local shellfish harvesters are not convinced of the need for restrictions, shellfish may be harvested surreptitiously from the closed areas. Thus, patrol failure may nullify the public-health safeguards resulting from sanitary survey activities.

The fact that law prohibits the removal of shellfish from certain areas will deter most persons from attempting to harvest such shellfish provided they are aware of the law and of the areas which are closed. However, local public opinion may not support the need for such closures. In such cases favorable opinion can probably be developed only through an educational program or a locally demonstrated need such as an epidemic or outbreak of paralytic shellfish poisoning. There is also a minority element not concerned with the welfare of their customers and who, through ignorance or purpose, will attempt to circumvent the harvesting restrictions.

Patrols must, therefore, be directed against three classes of individuals; i.e., those who are ignorant of the law, those who believe the law is unjust or unreasonable, and those who have no regard for the law.

Several mechanisms for improving the effectiveness of patrols include educational programs to acquaint shellfish harvesters with the public-health reasons for the closures, elimination of the "temptation element" by depletion, and relaying or purification. Apprehension, prosecution, and punishment of violators is a final resort.

The type of patrol organization needed for any particular situation cannot be specified and is determined by the nature of areas to be patrolled, means of access, methods of harvesting, and species. Patrol equipment should be such that the officers can apprehend persons harvesting shellfish in a closed area. Necessary equipment might include patrol boats capable of operating in open waters; small, high-speed, readily transportable boats, or patrol automobiles. In many instances, two-way radio will be helpful in coordinating patrol activities. Radar surveillance systems might also be of assistance, particularly during foggy weather or at night.

Organization of the patrol activity must take into consideration the need for night, weekend, holiday, and surprise patrols. Either nuisance or continual patrol may be used depending on the nature of the area to be patrolled and the type of industry.

The adequacy of State laws as a basis for prosecution is an important component of this activity. Shellfish patrol will probably be ineffective if State laws are so written or interpreted that violators cannot be successfully prosecuted, or if penalties are so small that they are economically unimportant. The latter point may be important in an area where local public opinion does not support the need for the restriction.

3. Depletion of Closed Areas. -- The State shellfish control or patrol agency shall supervise all depletion operations. All market-size shellfish and as many of the smaller size as can be gathered by reasonable methods shall be removed in the initial depletion operation. Depletion of each area shall be carried out at intervals to

prevent the development of market-sized shellfish.

Satisfactory compliance. -- This item will be satisfied when --

a. The State shellfish control or patrol agency exercises direct supervision over each depletion project including patrol of the area in which the shellfish are relaid. (See section D-1.)

b. All market shellfish and as many of the smaller size shellfish as can be gathered by reasonable methods are removed in the depletion operation.

c. Similar supervised depletion operations are carried out at intervals to prevent development of market-sized shellfish in quantities which would make commercial harvesting economically practicable in the depleted areas.

Public-health explanation. -- Complete removal of shellfish from polluted to clean areas under appropriate precautions is the best safeguard against contaminated shellfish reaching the market. In some cases depletion may be more economical and effective than patrol of closed areas.

Appendix A

BACTERIOLOGICAL CRITERIA FOR SHUCKED OYSTERS AT THE WHOLESALE MARKET LEVEL

The development of satisfactory bacteriological criteria for interstate shipments of oysters as received at the wholesale market level has been under consideration since 1950. At that time the Canadian Department of National Health and Welfare pointed out that most of the U. S. - shucked Eastern oysters sold in Canada had high coliform MPN's, high standard plate counts, or both (2). The Canadian experience with market standards for oysters was discussed at the 1956 National Shellfish Sanitation Workshop (2) and the Workshop adopted on an interim basis the following bacteriological standard for shucked Eastern oysters at the wholesale market level:

"Class 1, Acceptable: Shucked oysters with a Most Probably Number (MPN) of coliform bacteria of not more than 16,000 per 100 ml., and/or a Standard Plate Count of not more than 50,000 per ml.

"Class 2, Acceptable on Condition: Shucked oysters with a coliform MPN greater than 16,000 per 100 ml., but less than 160,000 per ml., and/or a Standard Plate Count greater than 50,000 per ml., but less than 1 million per ml. (The oysters will be accepted on the condition that the shellfish sanitation authority in the originating state will make immediate investigation of the producer's plant and operations and will submit a report of such investigations to the control agency in the market area. On the basis of this report the control agency in the market will reject or permit further shipments from the producer in question.)

"Class 3, Rejectable: Shucked oysters with a coliform MPN of 160,000 or more per 100 ml., and/or a Standard Plate Count of 1 million or more per ml."

In establishing the above interim standards, the 1956 Workshop recognized the limitations of the coliform group as an index of quality in that it failed to reveal whether the shellfish had been harvested from polluted areas or had been exposed to contamination during handling and processing subsequent to removal from the water. A recommendation was made that investigations be conducted to evaluate the significance of other bacterial indices. The fecal coliform group was suggested as a possible substitute for the coliform indices.

In partial fulfillment of this suggestion, a report on an interstate cooperative study to evaluate bacteriological criteria for market oysters was presented at the 1958 Shellfish Sanitation Workshop (3). A feature of this report was the development and evaluation of a method for the estimation of fecal coliform organisms following a procedure originally developed by Hajna and Perry (77). Gross increases in coliform organisms were observed during normal acceptable commercial practices. The magnitude of changes in coliform organisms was of the same order as those observed in plate counts. The results clearly demonstrated the inadequacy of the coliform group as an indicator of the sanitary quality of shellfish. It was further concluded that the plate count was of equal significance in revealing chance contamination or violations of acceptable storage time and temperature. On the other hand, the results of the examinations for fecal coliform organisms revealed a much higher degree of stability as the shellfish proceeded through commercial channels and thus suggested the greater suitability of this parameter as an index of sanitary quality at the wholesale market level. After due consideration of the report, the 1958 Workshop changed the interim bacteriological standard for fresh and frozen shucked oysters at the wholesale market level to the following:

Satisfactory.[15] E. coli density of not more than 78

MPN per 100 ml. of samples as indicated by production of gas in E. C. liquid broth media nor more than 100,000 total bacteria per ml. on agar at 35° C. will be acceptable without question. An E. coli content of 79 to 230 MPN per 100 ml. of sample or a total bacteria count of 100,000 to 500,000 per ml. will be acceptable in occasional samples. If these concentrations are found in two successive samples from the same packer or repacker, the State regulatory authority at the source will be requested to supply information to the receiving state concerning the status of operation of this packer or repacker.

Unsatisfactory.[15] E. coli content of more than 230 MPN per 100 ml. of sample or a total bacteria count of more than 500,000 per ml. will constitute an unsatisfactory sample and may be subject to rejection by the State shellfish regulatory authority. Future shipments to receiving markets by the shipper concerned will depend upon satisfactory operational reports by the shellfish regulatory authorities at the point of origin.

In adopting the above standards, the 1958 Workshop recommended that the cooperative studies conducted by city and State laboratories and the Public Health Service be continued.

The 1961 Workshop reviewed still more data collected by the collaborating agencies during the 1958-61 period (67) and after considerable deliberation agreed to continued use of the interim bacteriological standards arrived at by the 1958 Workshop.

The 1964 Workshop considered all bacteriological data available up to that time (Nov. 17-19), including date relative to Crassostrea gigas, and adopted the following standards on a permanent basis, versus the previous interim basis, as being applicable to all species of fresh and frozen oysters at the wholesale market level, provided they can be identified as having been produced under the general sanitary controls of the National Shellfish Sanitation Program.[16]

Satisfactory. Fecal coliform density[17] of not more than 230 MPN per 100 grams and 35° C. plate count[18] of not more than 500,000 per gram will be acceptable without question.

Conditional. Fecal coliform density of more than 230 MPN per 100 grams and/or 35° C. plate count of more than 500,000 per gram will constitute a conditional sample and may be subject to rejection by the State shellfish regulatory authority. If these concentrations are found in two successive samples from the same shipper, the State regulatory authority at the source will be requested to supply information to the receiving state concerning the status of operation of this shipper. Future shipments to receiving markets by the shipper concerned will depend upon satisfactory operational reports by the shellfish regulatory authorities at the point of origin.

In establishing the above bacteriological standards the 1964 Workshop took cognizance of the fact that no known health hazard was involved in consuming oysters meeting the standard; that oysters produced in the Gulf Coast States with warmer growing waters, could meet the standard if harvested, processed, and distributed according to the National Shellfish Sanitation Program requirements, and that the oysters harvested were from "approved" growing areas complying with the standards for growing areas established in part I of the PHS Publication No. 33.

Appendix A

FOOTNOTES

[15] E. coli was defined as coliforms which will produce gas from E. C. medium within 48 hours at 44.5° C. in a water bath will be referred to as fecal coliforms.

[16] The standards are not considered meaningful in the absence of such information.

[17] Fecal coliform organisms are those which, on transfer to E. C. medium from gas positive presumptive broth tubes show production of gas after incubation in a water bath at 44.5° C. ± 0.2° C. for 24 hours. Where air incubation is at 45.5° C. ± 0.2° C. comparative tests must be made to determine comparable time of incubation.

[18] Plate count is the number of bacteria determined by the "Standard Plate Count: procedure for shellfish described in the APHA Recommended Procedures for the Bacteriological Examination of Sea Water and Shellfish."

References

1. Jensen, E. T.: The 1954 National Conference on Shellfish Sanitation, Public Health Reports, vol. 70, No. 9 Sept. 1955.

2. Proceedings -- 1956 Shellfish Sanitation Workshop, mimeographed, Public Health Service, 1956.

3. Proceedings -- 1958 Shellfish Sanitation Workshop, lithographed, Public Health Service, 1958.

4. Woodward, Richard L.: How Probable is the Most Probable Number? Journal, American Water Works Association, vol. 49, No. 8; 1060-1068; August 1957.

5. Standard Methods for the Examination of Water and Waste Water, American Public Health Association.

6. A Study of the Pollution and Natural Purification of the Ohio River, Public Health Bulletin, No. 143, July 1924.

7. A Study of the Pollution and Natural Purification of the Ohio River, Public Health Bulletin, No. 204, May 1933.

8. Phelps, Earl B.: Stream Sanitation, John Wiley and Sons, Inc., New York, 1944.

9. Report on Committee on Sanitary Control of the Shellfish Industry in the United States, Supplement No. 53, Public Health Reports, Nov. 6, 1925.

10. Orlob, Gerald T.: Evaluating Bacterial Contamination in Sea Water Samples, Public Health Reports, Vol. 71, No. 12, December 1956.

11. Schantz, E. J.: Purified Shellfish Poison for Bioassay Standardization, Journal of the Association of Official Agricultural Chemists, Feb. 1958.

12. McFarren, E. F.: Mineograph 1-14-63. Available from P.H.S. Shellfish Sanitation Branch.

13. Fisher, L.M., Chairman: Report of the Committee of the Public Health Engineering Section of the American Public Health Association, American Journal of Public Health, 27, 180-196, Supplement, March 1937.

14. Old, H. N. and Gill, S. L.: A Typhoid Fever Epidemic Caused by Carrier Bootlegging Oysters, American Journal of Public Health, 30: 633-640, June 1940.

15. Hart, J. C.: Typhoid Fever from Clams, Connecticut Health Bulletin, December 1945.

16. Roos, Bertil: Hepatitis Epidemic Conveyed by Oysters Svenska Läkartidningen, vol. 53, No. 16, 989-1003, 1956. (Translation available from the Public Health Service.)

17. Lindberg-Broman, Ann Mari: Clinical Observations in the So-Called Oyster Hepatitis, Svenka Läkartidningen, vol. 53, No. 16, 1003-9, 1956 (Translation available from the Public Health Service.)

18. Meyers, K. F.: Medical Progress -- Food Poisoning, New England Journal of Medicine, 249: 765-773, 804-812 and 843-852 (Nov. 5, 12, and 19) 1953.

19. Lumsden, L. L., Hasseltine, H. E., Leak, J. P. and Veldee, M. V.: A Typhoid Fever Epidemic Caused by Oyster-Borne Infection, Public Health Reports, supp. No. 50, 1925.

20. A Report on the Public Health Aspects of Clamming in Raritan Bay, Public Health Service, reissued June 1954.

21. Dack, G. M.: Food Poisoning, third edition; the University of Chicago Press, 1956, fourth impression 1964.

22. Greenberg, Arnold E.: Survival of Enteric Organisms in Sea Water, Public Health Reports, vol. 71, No. 1, January 1956.

23. An Investigation of the Efficacy of Submarine Outfall Disposal of Sewage and Sludge, Publication No. 14, California State Water Pollution Control Board, 1956.

24. Harris, Eugene K.: On the Probability of Survival of Bacteria in Sea Water, Biometrics, June 1958.

25. Wood, P. C.: Factors Affecting the Pollution and Self-Purification of Molluscan Shellfish, Extrait du Journal du Conseil International Pour l'Exploration de la Mer, vol. XXII, No. 2, 1957.

26. Arcisz, William and Kelly, C. B.: Self-Purification of the Soft Clam, Mya arenaria, Public Health Reports, vol. 70, No. 6; 605-614, June 1955.

27. Investigation of Pollution of Tidal Waters of Maryland and Virginia, Public Health Bulletin No. 74, 1916.

28. Investigation of the Pollution of Certain Tidal Waters of New Jersey, New York and Delaware, Public Health Bulletin No. 86, 1917.

29. Mood, Eric W.: First Typhoid Case in Seven Years, Monthly Report of the New Haven, Conn., Department of Health, December 1948.

30. Bidwell, Milton H., and Kelly, C. B.: Ducks and Shellfish Sanitation, American Journal of Public Health, vol. 40, No. 8, August 1950.

31. Effects of Atomic Radiation on Oceanography and Fisheries, Publication No. 551, National Academy of Sciences, National Research Council, 1957.

32. Gong, J. K., et al.: Uptake of Fission Products and Neutron-Induced Radionuclides by the Clam, Proceedings of the Society for Experimental Biology and Medicine, vol. 95, 451-454, 1957.

33. Studies of the Fate of Certain Radionuclides in Estaurine and Other Aquatic Environments. Public Health Service Publication No. 999-R-3.

34. Weiss, H. V., and Shipman, W. H.: Biological Concentration by Killer Clams of Cobalt-60 from Radioactive Fallout, Science, vol. 125, No. 3250, April 1957.

35. Title 10, Part 20, Code of Federal regulations.

36. Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air and in Water for Occupational Exposure, National Bureau of Standards Handbook 69, June 5, 1959.

37. Water Quality Survey of Hampton Roads Shellfish Areas, Virginia State Department of Health and U. S. Public Health Service, 1950.

38. Tennant, A. D., Neubert J., and Corbeil, H. E.: An OUtbreak of Paralytic Shellfish Poisoning, the Canadian Medical Association Journal, 72: 436-439, 1955.

39. Proceedings -- 1957 Conference on Paralytic Shellfish Poison, mimeographed: Public Health Service, 1958.

40. McFarren, E. F., et al.: Public Health Significance of Paralytic Shellfish Poison -- Advances in Food Research, vol. 10, 1960.

41. Galtsoff, P. S.: Biology of the Oyster in Relation to Sanitation, American Journal of Public Health, vol. 26, 245-247, 1936.

42. Loosanoff, V. L.: Some Aspects of Behavior of Oysters at Different Temperatures, Biological Bulletin, vol. 114, No. 1, 57-70, 1958.

43. Gage, S. DeM., and Gorham, P.: Self-Purification of Oysters During Hibernation, American Journal of Public Health, December 1925.

44. Cumming, Hugh S.: Investigation of the Pollution and Sanitary Conditions of the Potomac Watershed with Special Reference to Self-Purification and the Sanitary Conditions of Shellfish in the Lower Potomac River, U. S. Public Health Service, Hygienic Laboratory Bulletin No. 104, February 1916.

45. Fisher, L. M., and Acker, J. E.: Bacteriological Examinations of Oysters and Water from Narragansett Bay During the Winter and Spring in 1927-28, Public Health Reports, vol. 50, No. 42, October 18, 1935.

46. Gibbard, James, et al.: Effect of Hibernation on Content of Coliform Bacteria in Oysters, American Journal of Public Health, vol. 32, 979-986, September 1942.

47. Wachter, L. M.: The Laboratory Aspects of Oyster Pollution, American Journal of Public Health, 15, 1066-68, 1925.

48. Public Health Service Drinking Water Standards, PHS pub. 956.

49. ZoBell, C. E., and Landon, W. A : Bacterial Nutrition of the California Mussel, Proc. Soc. Exper. Biol. and Med., 36, 607-609 (1937).

50. Wood, P. C.: The Cleansing of Oysters, Public Health, February, 1957.

51. Erdman, I. E., Kelly, J. M., and Tennant, A. D.: 1954 Clam Cleansing Studies (Mya), Manuscript Report, Fish Inspection Laboratories, No. 55-1, Canada Department of Fisheries.

52. Messer, R., and Reece, G. M.: Progress in Oyster Conditioning With Report of Experiments at the Demonstration Plant, Norfolk, Va., Public Health Reports, Reprint No. 1870, 1451-1460, 1937.

53. Galtsoff, Paul S.: Reaction of Oysters to Chlorination, Research Report 11, Fish and Wildlife Service, 1946.

54. Sandholzer, L. A., and Buckner, C. R.: Bacteriological Studies of Oyster Conditioning, Commercial Fisheries Review, 9, 7-11, 1947.

55. Loosanoff, V. L., and Tommers, F. S.: The Effect of Suspended Silt and Other Substances on the Rate of Feeding of Oysters, Science, 107, 69, 1948.

56. Collier, Albert, et al.: Effect of Dissolved Organic Substances on Oysters, Fishery Bulletin 84, Fish and Wildlife Service, 1953.

57. Vilela, H.: Oysters in Consumption and in the National Economy, publication 18, Council of Studies of Fisheries, Separate from Bulletin of Fisheries No. 43, Lisbon, Portugal, 1954. (Translation available from the Public Health Service).

58. Report of the Special Commission Established To Make an Investigation and Study Relative to Edible Shellfish and Shellfish Chlorinating Plants, the Commonwealth of Massachusetts, December 1947.

59. Swansburg, K. B., and Mullan, M. W.: Studies in the Self-Cleansing of Quahougs (Venus mercenaria, L.), manuscript report 57-2. Canada Department of Fisheries, 1957.

60. Cole, H. A.: Purification of Oysters in Simple Pits, Fishery Investigations, series II, vol. XVIII, No. 5, Ministry of Agriculture and Fisheries, London, 1954.

61. Reynolds, Nial: A Simplified System of Mussel Purification, Fishery Investigations, series II, vol. XX, No. 8, Ministry of Agriculture and Fisheries, London, 1956.

62. Recommended Procedures for the Bacteriological Examination of Sea Water and Shellfish, American Public Health Association.

63. Ringe, Mila E., Clem, David J., Linkner, Robert E., and Sherman, Leslie K.: A Case Study on the Transmission of Infectious Hepatitis by Raw Clams, published by U. S. Department of Health, Education and Welfare, Public Health Service.

64. Mason, James O., and McLean, W. R.: Infectious Hepatitis Traced to the Consumption of Raw Oysters, American Journal of Hygiene, vol. 75, No. 1, Jan. 1962.

65. Communicable Disease Center Hepatitis Surveillance, Report No. 18, March 31, 1964, and Report No. 19, June 30, 1964. U. S. Department of Health, Education and Welfare, Public Health Service.

66. Official Methods of Analysis of the Association of Official Agricultural Chemists, published by the Association of Official Agricultural Chemists.

67. Proceedings -- 1961 Shellfish Sanitation Workshop, Lithographed, Public Health Service, 1962.

68. Proceedings -- 1964 Shellfish Sanitation Workshop, Lithographed, Public Health Service, 1965.

69. Communicable Disease Center Hepatitis Surveillance, Report No. 5, May 3, 1961, and Report No. 6, September 28, 1961. U. S. Department of Health, Education, and Welfare, Public Health Service.

70. Metcalf, T. G.; and Stiles, W. C.: The accumulation of the Enteric Viruses by the Oysters, Crassostrea virginica. Journal of Infectious Diseases, vol. 115, 68-86, 1965.

71. Hedstrom, C. E., and Lycke, E.: An Experimental Study on Oysters, American Journal Hygiene, vol. 79, 143-153.

72. Crovari, Piero Dr.: Some Observations on the Depuration of Mussels Infected with Poliomelitis Virus, Iqiene Moderna, vol. 51, 22-32, 1958. Translation available from PHS Shellfish Sanitation Branch.

73. Kabler, Paul: Removal of Pathogenic Micro-Organisms by Sewage Treatment Processes, Sewage and Industrial Wastes, vol. 31, 1373-82 (Dec. 1959).

74. Kelly, Salley, and Sanderson, W. W.: The Effect of Sewage Treatment on Viruses, Sewage and Industrial Wastes, vol. 31, 683-89 (June 1959).

75. Clarke, Norman A., and Kabler, Paul W.: Human Enteric Viruses in Sewage, Health Laboratory Science, vol. 1 44-50 (Jan. 1964).

76. Eldred, B., Steidinger, K., and Williams, J.: Preliminary Studies of the Relation of Gymnodinum Breve Counts to Shellfish Toxicity. A Collection of Data in Reference to Red Tide Outbreaks During 1963, Reproduced by the Marine Laboratory of the Florida Board of Conservation, St. Petersburg, Florida, May 1964.

77. Hajna, A. A., and Perry, C. A., 1954, Comparative Study of Presumptive and Confirmatory Media for Bacteria of the Coliform Group and for Fecal Streptococci, American Journal of Public Health, 33, 550-556.

78. Mitchell, J. R., Presnell, M. W., Akin, E. W., Cummins, J. M., and Liu, O. C.: Accumulation and Elimination of Poliovirus by the Eastern Oyster, manuscript in preparation.

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NATIONAL SHELLFISH SANITATION PROGRAM

MANUAL OF OPERATIONS

PART II

SANITATION
OF THE
HARVESTING AND PROCESSING
OF
SHELLFISH

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1925. Supplement No. 53 to Public Health Reports, November 6, 1925 "Report of Committee on Sanitary Control of the Shellfish Industry in the United States".

1937. United States Public Health Service Minimum Requirements for Approval of State Shellfish Control Measures and Certification for Shippers in Interstate Commerce. (Revised October 1937.)

1946. Manual of Recommended Practice for Sanitary Control of the Shellfish Industry Recommended by the U. S. Public Health Service (Public Health Bulletin No. 295).

1957. Manual of Recommended Practice for Sanitary Control of the Shellfish Industry Part II: Sanitation of the Harvesting and Processing of Shellfish. Printed as Part II of Public Health Service Publication No. 33.)

1959. Manual of Recommended Practice for Sanitary Control of the Shellfish Industry Part I: Sanitation of Shellfish Growing Areas. (Printed as Part I of Public Health Service Publication No. 33.)

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FOREWORD

A DECLARATION OF PRINCIPLES

The National Shellfish Sanitation Program is an unusual teaming of State and Federal resources to preserve and manage a natural resource for a beneficial use. Although the current program is of comparatively recent origin, its development can be traced back through several centuries of American history. When the European colonists arrived they found almost unimagined natural wealth. Forest, rich agricultural land, minerals and space itself were present in quantities and a variety previously unknown. To these settlers one of the most valuable and readily usable of these natural resources was the food resources of the sea, particularly the estuaries. It is not surprising that shellfish were foremost among their staple food items.

The value of these renewable and natural resources to the early settlers was reflected in colonial legislation designed to encourage their wise use. In 1658 -- over 300 years ago -- the Dutch council of New Amsterdam passed an ordinance regulating the taking of oysters from the East River. Other early legislation, including that of New York (1715), New Jersey (1730), and Rhode Island (1734), was designed to regulate harvesting, presumably as conservative measures to guarantee a continuing supply.

The public health problems which were associated with shellfish in the United States in the first two decades of the present century brought a new dimension to natural resource utilization; i.e., shellfish could not be used for food unless of acceptable sanitary quality. This concept was clearly recognized in the PHS-sponsored conference of 1925 in which the concepts of the present cooperative program were first outlined and the administrative foundation put down. All parties seemed to recognize, and accept as fact, the premises that: (1) shellfish represented a valuable natural food resource; (2) the cultivation, harvesting and marketing of this food resource were valuable components in the financial bases of many coastal communities; (3) a State and Federal program was necessary to permit the safe use of this resource; and (4) the transmission of disease by shellfish was preventable and therefore not to be tolerated. It is significant that the founders of this program did not take the parochial stand that the only completely safe way to prevent disease transmission by shellfishwas to prohibit its use. Instead, they held that this beneficial use of the estuaries was in the best public interest, and that sanitary control should be developed and maintained which would allow safe use. These concepts were recognized in the program which evolved following the report of the "Committee on Sanitary Control of the Shellfish Industry in the United States" in 1925.

In 1954 the Surgeon General of the U. S. Public Health Service called a second national conference to discuss shellfish sanitation problems. Specifically, the 1954 conference addressed itself to the questions of the practicality and need for this tripartite program. There was general agreement that, despite the profusion of technical problems, the basic concepts were sound and that it was in the public interest to maintain the program. Thus, the presence of an irrevocable bond between the application of sanitary controls in the shellfish industry and the continuing beneficial use of a renewable natural resource was again confirmed.

Despite this long-established relationship, the national program has tended to neglect the second of these biphasic goals -- use of a valuable natural resource -- and to concentrate on the negative policy of closure of areas of unsuitable sanitary quality. Little effort has been made by the program to develop a compensatory element which would encourage corrective action by State or Federal agencies. Similarly, the program has not taken a position on the use of conservation law even when it was known that this would increase the programs consumer protection confidence factor.

In recognition of past history of the shellfish industry in the United States and of the relationship of the National Shellfish Sanitation Program to the effective use of this natural resource, the 1964 Shellfish Sanitation Workshop endorses the following principles:

1. Shellfish are a renewable, manageable natural resource of significant economical value to many coastal communities, and which should be managed as carefully as are other natural resources such as forest, water, and agricultural lands.
2. Shellfish culture and harvesting represents a beneficial use of water in the estuaries. This use should be recognized by State and Federal agencies in planning and carrying out pollution prevention and abatement programs and in comprehensive planning for the use of these areas.
3. The goals of the National Shellfish Sanitation Program are: (1) the continued safe use of this natural resource, and (2) active encouragement of water

quality programs which will preserve all possible coastal areas for this beneficial use.

It is the conviction of the 1964 National Shellfish Sanitation Workshop that survival of the shellfish industry is in the best public interest; that by application of the above principles on a State-by-State basis, shellfish can continue to be used safely as food and to make a valuable contribution to the economic structure of the Nation both in the immediate present and in the foreseeable future.

INTRODUCTION

In 1925 State and local health authorities and representatives of the shellfish industry requested the Public Health Service to exercise supervision over the sanitary quality of shellfish shipped in interstate commerce. In accordance with this request, a cooperative control procedure was developed. In carrying out this cooperative control, the States, the shellfish industry, and the Public Health Service each accept responsibility for certain procedures as follows:

1. PROCEDURES TO BE FOLLOWED BY THE STATE. -- Each shellfish-shipping State adopts adequate laws and regulations for sanitary control of the shellfish industry, makes sanitary and bacteriological surveys of growing areas, delineates and patrols restricted areas, inspects shellfish plants, and conducts such additional inspections, laboratory investigations, and control measures as may be necessary to insure that the shellfish reaching the consumer have been grown, havested, and processed in a sanitary manner. The State annually issues numbered certificates to shellfish dealers who comply with the agreed-upon sanitary standards, and forwards copies of the interstate certificates to the Public Health Service.

2. PROCEDURES TO BE FOLLOWED BY THE PUBLIC HEALTH SERVICE. -- The Public Health Service makes an annual review of each State's control program including the inspection of a representative number of shellfish-processing plants. On the basis of the information thus obtained, the Public Health Service either endorses or withholds endorsement of the respective State control programs. For the information of health authorities and others concerned, the Public Health Service publishes a semimonthly list of all valid interstate shellfish-shipper certificates issued by the State shellfish-control authorities.

3. PROCEDURES TO BE FOLLOWED BY THE INDUSTRY. -- The shellfish industry cooperates by obtaining shellfish from safe sources, by providing plants which meet the agreed-upon sanitary standards, by maintaining sanitary plant conditions, by placing the proper certificate number on each package of shellfish, and by keeping and making available to the control authorities records which show the origin and disposition of all shellfish.

The fundamental components of this National Shellfish Sanitation program were first described in a Supplement to Public Health Reports, "Report of Committee on Sanitary Control of the Shellfish Industry in the United States" (1925). This guide for sanitary control of the shellfish industry was revised and reissued in 1937 and again in 1946. It was separated into two parts by publication of Part II, Sanitation of the Harvesting and Processing of Shellfish in 1957 and by publication in 1959, of Part I, Sanitation of Shellfish Growing Areas. The need for a specialized program of this nature was reaffirmed at the National Conference on Shellfish Sanitation held in Washington, D. C., in 1954 (1) and at the Shellfish Sanitation Workshops held in 1956 (2), 1958 (3), 1961 (67), and 1964 (68).

This addition of the shellfish sanitation manual has been prepared in cooperation with the State shellfish control authorities in all coastal States, food control authorities in the inland States, interested Federal agencies, Canadian Federal departments, the Oyster Institute of North America, the Pacific Coast Oyster Growers Association, and the Oyster Growers & Dealers Association of North America.

Since the growing and processing of shellfish are two distinct phases of operation in the shellfish industry, the manual has been prepared in two parts: I: Sanitation of Shellfish-Growing Areas; and II: Sanitation of the Harvesting and Processing of Shellfish. This, Part II of the manual is intended as a guide for the preparation of State shellfish sanitation laws and regulations, for sanitary control of the harvesting and processing of shellfish, and for the shellfish industry in the maintenance of sanitary conditions during the harvesting and processing of shellfish. It is intended that States participating in the National Shellfish Sanitation program for the certification of interstate shellfish shippers will be guided by this manual in exercising sanitary supervision over harvesting, shucking, packing, repacking, and reshipping shellfish, and in the issuing of certificates to shellfish shippers.

The manual will also be used by the Public Health Service in evaluating State shellfish sanitation programs to determine if the programs qualify for endorsement. Part III of the Manual, "Public Health Service Appraisal of State Shellfish Sanitation Programs," sets forth appraisal procedures in evaluating State shellfish sanitation programs and is based on the requirements contained in parts I and II.

The provisions of this manual were accepted at the Shellfish Sanitation Workshop held in Washington, D. C., November 17-19, 1964, and unless otherwise stated become effective 60 days after publication (68).

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DEFINITIONS

And/or. -- Where this term is used, "and" shall apply where possible; otherwise, "or" shall apply.

Approved area. -- An area which has been approved by the State control agencies for growing and/or harvesting of shellfish for direct marketing.

Classes of shippers. -- (a) Reshippers are shippers who transship shucked stock in original containers, or shell stock, from certified shellfish shippers to other dealers or to final consumers. (Reshippers are not authorized to shuck or repack shellfish.)

(b) Repackers are shippers, other than the original shucker, who pack shucked shellfish into containers for delivery to the consumer. Shippers classified as repackers may shuck shellfish if they have the necessary facilities. A repacker may also act as a shell-stock shipper if he has the necessary facilities.

(c) Shell-stock shippers are shippers who grow, harvest, buy, and/or sell shell stock. They are not authorized to shuck shellfish nor to repack shucked shellfish.

(d) Shucker-packers are shippers who shuck and pack shellfish. A shucker-packer may act as a shell-stock dealer. (Shucker-packers are classified as repackers if shucked shellfish are regularly repacked.)

Dry storage. -- The storage of shell stock out of water.

Food-product zone. -- The parts of food equipment, including auxiliary equipment (such as blower pipes and drain valves), which may be in contact with the food being processed, or which may drain into the portion of equipment with which food is in contact.

Internal temperature. -- Actual temperature of shucked shellfish in the container, as opposed to the air temperature of the refrigerator in which the shellfish may be stored.

Person. -- Person shall mean an individual, or a firm, partnership, company, corporation, trustee, association, or any public or private entity.

Shellfish. -- All edible species of oysters, clams, or mussels, either shucked or in the shell, fresh or frozen.

Shell-stock. -- Shellfish which remain in their shells.

Shucked shellfish. -- Shellfish, or parts thereof, which have been removed from their shells.

Wet storage. -- The temporary storage of shellfish from approved sources, intended for marketing, in tanks containing sea water or in natural bodies of water, and including storage in floats.

SECTION A

HARVESTING AND HANDLING SHELL-STOCK

1. BOATS AND TRUCKS. -- All boats used in tonging, dredging, or transporting shellfish, including "buy" boats, and all trucks used for hauling bulk shell-stock shall be so constructed, operated, and maintained as to prevent contamination or deterioration of the shellfish, and shall be kept clean.

Public-health explanation. -- Precautions exercised in gathering shellfish from approved growing areas may be nullified by contamination with bilge water or polluted overboard water.

Satisfactory compliance. -- This item will be satisfied when --

a. Decks and/or storage bins are so constructed and located as to prevent bilge water or polluted overboard water from coming into contact with the shellfish, Removable false bottoms will ordinarily be required in all small craft, including rowboats, skiffs, and power boats, used in the transport of shell-stock.

b. Bilge pumps are so located that pumpage will not contaminate shellfish.

c. Sacks or other containers used for the storage of shellfish are clean.

d. Boat decks and storage bins are kept clean with water from an approved source.

e. That portion of boats or trucks (decks, storage bins, floorbeds, etc.) and all other equipment (shovels, wheelbarrows, rakes, etc.) in contact with shellstock during handling or transport from polluted areas to approved areas for relaying are thoroughly cleaned before they are used for the transport or handling of shellfish from approved areas.

f. Trucks used for the transport of bulk shell stock are so constructed as to protect the shellfish from contamination, and are kept clean.

2. WASHING OF SHELL-STOCK. Shell-stock should be washed reasonably free of bottom sediments and detritus as soon after harvesting as is practicable. The primary responsibility for washing rests with the harvester. Water used for shell-stock washing should be obtained from an approved growing area, or from other sources approved by the State regulatory agency.

Public-health explanation. -- When muddy shell stock are shucked, quantities of mud and bacteria are mixed with the shucked shellfish, thereby contributing to high bacteria counts in the finished product.

These bacteriological changes which take place during the shucking of oysters (Crassostrea virginica) in the Middle Atlantic States have been investigated at the Public Health Service's Shellfish Sanitation Laboratory (Kelly and Arcisz: "Bacteriological Control of Oysters During Processing and Marketing," Public Health Reports, vol. 69, No. 8, August 1954).

During shucking, the percentage of samples of oysters having coliform Most Probable Numbers (MPN's) in excess of 2,400 per 100 ml. of meats was found to increase from 18 to 72, and the percentage of samples of oysters having coliform MPN's in excess of 24,000 per 100 ml. of meat increased from zero to 14. Mud and detritus adhering to the shells were implicated as responsible for the increase in coliform counts.

Muddy shell-stock also make it difficult to maintain shucking rooms in a clean, sanitary condition.

Water used for shell-stock washing should be of good sanitary quality, to avoid possible contamination of the shell stock.

Satisfactory compliance. -- This item will be satisfied when --

a. Shell-stock are washed reasonably free of bottom sediments and detritus as soon after harvesting as is feasible. Washing of naturally clean shell stock is not necessary. Shell-stock should preferably be washed at the time of harvesting; however, this may not always be feasible because of the harvesting method or climatic conditions. In other instances, shellstock washing by the harvester might introduce a sanitary hazard because of the possible tendency of the harvester to wash the shell-stock with polluted water from a harbor area, rather than with clean water from a growing area. State shellfish control authorities may, therefore, at their discretion, waive the requirement for shell-stock washing by the harvester when, in the State's opinion, there are climatic, technical, or sanitary reasons for such action.

b. Water used for washing shell-stock is obtained from an approved growing area, or from other sources approved by the State regulatory authority.

DISPOSAL OF BODY WASTES. -- During the marketing season, body wastes shall not be discharged overboard from a boat used in the harvesting of shellfish, or from "buy" boats while in areas from which shellfish are being harvested. The State shellfish control agency, when necessary, shall specify the device and practices necessary to eliminate the overboard discharge of body wastes from boats used in harvesting of shellfish. It is recommended that each State shellfish control agency maintain an educational program for all boat owners concerning the public health significance and dangers inherent in the overboard discharge of body wastes.

Public-health explanation. -- Gastrointestinal infections may be conveyed by shellfish; hence, it is necessary to protect the shellfish from pollution by disease-causing organisms that may be present in body wastes. This item is intended to protect the shellfish from chance pollution during harvesting. The discharging of body wastes from either harvesting or "buy" boats will be considered in the evaluation of harvesting practices.

Satisfactory compliance. -- This item will be satisfied when --

a. No body wastes are discharged from a boat used in harvesting shellfish while in an area from which shellfish are being harvested.

b. No body wastes are discharged from a "buy" boat while in an area in which shellfish are being harvested.

c. It is evident that soil cans, if provided, are used for the purpose intended.

d. Soil cans, where used, are so secured and located as to prevent contamination of the shellfish by spillage or leakage.

e. The contents of soil cans are disposed of by discharge into an approved sewage-disposal system, and soil cans are cleaned before being returned to the boat.[1] (Faclities used for cleaning food-processing equipment may not be used for this purpose.)

4. LICENSES FOR COMMERCIAL HARVESTERS. -- Each person who handles unshucked shellfish prior to delivery or sale to a dealer certified under the cooperative program shall have a valid State permit or license to do so.

In the case of leased land, either the lessee shall be licensed or the person who harvests shall be licensed by the State. The State agency having primary responsibility for granting licenses shall maintain a record of all such licenses granted for review by the appropriate Public Health Service regional office.

Satisfactory compliance. -- This item will be satisfied when --

a. Each person harvesting shellfish has a valid permit or license to do so.

b. The State agency having responsibility for granting licenses maintains a record of all such licenses granted for review by the appropriate Public Health Service regional office.

c. In the case of leased growing area(s), either the lessee or the person who harvests shall be licensed by the State.

[1] For use and construction of soil-can-washing facilities, see Public Health Service Publication No. 66, Handbook on Sanitation of Railroad Servicing Areas, on sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402, at 20 cents.

SECTION B

SHUCKING AND PACKING SHELLFISH

1. WET STORAGE. -- Shellfish in wet storage shall be protected against sewage contamination. Wet storage shall not be practiced by a shipper unless written approval is given each year by the State regulatory authority. This approval is to include a sketch, drawn to scale, showing the approval location of the storage area, floats, or the water intake for the wet-storage tanks, and all the potential hazards to which the stored shellfish may be exposed. The approval statement shall describe the measures taken to protect the shellfish from the potential hazards. The presence of usable wet-storage tanks in a plant, or the presence of usable floats in the water, shall be deemed evidence that wet

storage is being practiced.

Public-health explanation. -- Removal of shellfish from growing beds to storage areas close to shore and habitations, and frequently in shallow water, may subject an accumulated quantity of shellfish to constant or intermittent pollution. Shellfish in wet-storage tanks are similarly subject to pollution if the water is obtained from a polluted source. Shellfish on floats are more directly exposed to chance contamination from boats than are shellfish stored in the growing areas themselves, since it is customary to "float" the shellfish near the surface, where fresh sewage is apt to be found in greatest concentration. Shellfish on floats, therefore, are protected to a less degree by dilution than are shellfish on bottom areas.

Satisfactory compliance. -- This item will be satisfied when --

a. Shellfish in wet storage are protected against sewage contamination.

b. Wet storage is practiced only in strict compliance with the terms of the written approval of the State regulatory authority. This approval is to include: (1) a sketch, drawn to scale, showing the location of the storage area or water intakes and the potential hazards to which the shellfish may be exposed; and (2) a statement describing the measures taken to protect the shellfish from the above potential hazards. This written approval shall be valid for not more than 12 months.

2. PLANT ARRANGEMENT. -- Plants in which shellfish are shucked and packed shall, to the extent feasible, be so located that they will not be subject to flooding by high tides. If plant floors become flooded, shucking shall be discontinued until after waters have receded and the building cleaned.

Shucking and packing operations shall be conducted in separate rooms. A shucked-stock delivery window shall be installed in the partition between the two rooms. Packing rooms shall be of sufficient size to permit sanitary handling of the product and thorough cleaning of equipment.

A separate room or rooms, or lockers, shall be provided for storing employees' street clothing, aprons, gloves, and personal articles.

Public-health explanation. -- The nature of the shucking operation is such that the shuckers' clothing becomes very soiled. If shuckers enter the packing room, shucked stock, cans, and other equipment may become contaminated. Rooms or lockers should be provided for clothing, aprons and gloves to eliminate the tendency to store such articles on the shucking benches or in packing rooms, where they interfere with plant cleanup and operation.

Satisfactory compliance. -- This item will be satisfied when --

a. Processing establishments are so located that they will not be subject to flooding by ordinary high tides. (A minimum plant elevation of at least 2 feet above high tides is recommended.) If plant floors are flooded, shucking is discontinued until after waters have receded and the building is cleaned.

b. Shucking and packing operations are carried on in separate rooms. Flytight screening may be accepted in lieu of a solid wall between the shucking and packing rooms, provided that the packing room is so situated that there is no likelihood of the shucked product or packing-room equipment being contaminated by splash from the opening room.

c. The delivery window is equipped with a corrosion-resistant shelf of metal, concrete, or tile, draining toward the shucking room and, if necessary, curbed on the packing-room side.

d. Packing rooms are large enough to permit sanitary handling of shellfish and thorough cleaning of equipment.

e. Rooms or lockers are provided which have adequate capacity for storing clothing, aprons, gloves, and other personal articles of employees.

3. DRY STORAGE OF SHELL-STOCK. -- Shell-stock in dry storage shall be protected from contamination. Rooms, benches, or hoppers shall be provided for the storage of shell-stock. Floor wastes from a shell-stock storage area shall be discharged through a separate drainage system, or, if discharged into a general drainage system carrying sanitary wastes, an airgap shall be provided.

Public-health explanation. -- Smooth, wash-stored where polluted ground or surface water or floor drainage can accmulate, the shell-stock may become contaminated. Shell-stock may also be contaminated by domestic animals and rodents (see Section B, Items 12 and 15).

Satisfactory complaince. -- This item will be satisfied when --

a. The storage-area floor is constructed of material impervious to water, is free from cracks and uneven surfaces that interfere with proper cleaning or drainage, and is graded to assure complete and rapid drainage of water away from the shellfish.

b. Walls of shell-stock storage rooms and hoppers are smooth and of material which will not deteriorate under repeated washing.

c. Shell-stock storage areas are so constructed that they will not receive floor drainage water from other portions of the plant. If such construction is not feasible, the shell-stock should be stored on racks to prevent them from coming into contact with the floor or with water which might accumulate on the floor. Shell-stock storage areas should not serve as an entry way to other areas of the establishment. Shell-stock storage areas are protected against sewage backflow by the installation of an airgap in the waste line or by provision of a separate drain system.

d. Conveyances or devices used in the transport of shell-stock are so constructed that they may be easily cleaned and are kept reasonably clean. (Use of impervious materials is recommended wherever possible.)

4. FLOORS. -- Floors shall be constructed of concrete or other material impervious to water, and shall be graded to drain quickly, shall be free from cracks and uneven surfaces that interfere with proper cleaning or drainage, and shall be maintained in good condition.

Public-health explanation. -- Properly graded floors, of durable, impervious material, maintained in good condition, permit rapid disposal of liquid and solid wastes, and are easily cleaned.

Satisfactory compliance. -- This item will be satisfied when --

a. The floors of all rooms in which shellfish are shucked or packed, or in which utensils are washed, are constructed of concrete of good quality, or of equally impervious tile laid closely with impervious joint material, or of metal surfacing with impervious joints, or of any other material which is equivalent to good quality concrete; and when the floors are maintained in good repair.

b. The floor surface is smooth, and graded to drain, and the junctions between floors and walls are impervious to water.

5. WALLS AND CEILINGS. -- The interior surfaces of rooms in which shellfish are shucked or packed, or in which utensils are washed, shall be smooth, washable, light-colored, and kept in good repair.

Public-health explanation. -- Smooth, washable walls and ceilings are more easily kept clean and are, therefore, more likely to be kept clean. A light-colored paint or finish aids in the distribution of light and in the detection of unclean surfaces. Clean walls and ceilings are conducive to clean shellfish handling.

Satisfactory compliance. -- This item will be satisfied when interior surfaces are of tile, concrete, cement plaster, concrete blocks, painted wood, or equivalent material, having a smooth, washable, light-colored surface. (Structural members may be exposed, provided that they do not interfere with cleaning.)

6. FLY-CONTROL MEASURES. -- All outer openings to toilet and wash rooms, shucking and packing rooms, utensil

cleaning and storage rooms, and locker rooms shall be effectively screened during the seasons when flies are present, unless other effective means are provided for preventing the entrance of flies. Effective in-plant fly-control measures shall be used to kill or capture flies which may enter the plant despite the screening. Shell-stock storage rooms shall be screened as necessary, to prevent the entrance of flies into the other portions of the plant. All interior doors or other openings into the packing room should be screened whenever necessary to keep the packing room free of flies.

Public-health explanation. -- Flies may contaminate the shellfish with disease organisms, thus nullifying the effectiveness of all other public-health safeguards.

Satisfactory compliance. -- This item will be satisfied when --

a. All outer openings are effectively screened whenever flies are present; or other effective devices are provided to prevent the entrance of flies.

b. Screen doors open outward and are self-closing.

c. Flies are not present.

d. Necessary internal fly-control measures are used, and such measures are approved by the State regulatory authority.

7. LIGHTING -- Ample natural and/or artificial light shall be provided in all working and storage rooms.

Public-health explanation. -- Adequate lighting encourages cleanliness of rooms, equipment and product, and helps to prevent eyestrain.

Satisfactory compliance. -- This item will be satisfied when work and storage rooms are lighted to at least the intensity indicated below:

TYPE OF AREA	FOOT CANDLES OF ILLUMINATION[1]
Working surfaces in packing rooms	[2]25
Shucking benches and utensil-washing areas	[2]15
Storage rooms, including cold-storage rooms	[3]5

[1] Approximate. Measure as incident light.

[2] Overall illumination level in area should be at least 10 ft.-c.

[3] Measured 30 inches above the floor.

8. HEATING AND VENTILATION. -- Working rooms shall be ventilated, and shall be heated when necessary.

Public-health explanation. -- Uncomfortable working conditions impair the efficiency of the workers, and may result in insanitary practices.

Proper ventilation reduces condensation, and aids in retarding the growth of mold.

Satisfactory compliance. -- This item will be satisfied when --

a. A comfortable working temperature is maintained.

b. Sufficient ventilation is provided to eliminate odors, discomfort and excessive condensation.

9. WATER SUPPLY. -- The water supply shall be easily accessible, adequate, and of a safe and sanitary quality.

Public-health explanation. -- The water supply should be accessible in order to encourage its use in cleaning operations; it should be adequate to insure proper washing, rinsing, and bactericidal treatment of the equipment; and it should be of a safe and sanitary quality, to avoid contamination of the equipment and product.

Satisfactory compliance. -- This item will be satisfied when --

a. The water supply is approved as safe by the responsible State authority, or complies with the Public Health Service Drinking Water Standards. (Private water systems are so constructed and operated as to be at least equal to the recommendations contained in Public Health Service Publication No. 24, "Manual of Individual Water Supply Systems.")[2 3]

b. All shell-stock storage rooms, shucking and packing rooms, and utensil washrooms are provided with water outlets.

c. An automatically regulated hot-water system is provided which has sufficient capacity to furnish water with a temperature of at least 130°F. during all hours of plant operation.

d. Sufficient water is available for all plant needs. (Nonpressure supplies will not constitute compliance.)

e. Hot and cold water outlets are provided at each sink compartment, except that warm water only may be acceptable at handwashing sinks, as provided by Section B, Item 10 e.

10. PLUMBING AND RELATED FACILITIES. -- Plumbing shall be installed in compliance with State and local plumbing ordinances, or, in the absence of such ordinances, shall be substantially equivalent to the recommendations contained in the American Standard National Plumbing Code ASA A40.8-1955.[4] Lavatories with running hot and cold (or warm) water shall be so located that their use by plant personnel can be readily observed. Signs shall be posted in toilet rooms and near lavatories, directing employees to wash their hands before starting work and after each interruption. Conveniently located, separate toilets shall be provided for each sex; however, separate toilet facilities for each sex shall not be required when family shucking is carried on and satisfactory

toilet facilities are located nearby, or when the plant has fewer than 10 employees.

Public-health explanation. -- The organisms causing typhoid fever, paratyphoid fever, dysentery, and other gastrointestinal diseases may be present in the body discharges of cases or carriers, and may thus be present in the drainpipes in the plant. Correctly installed plumbing protects the water supplies from back siphonage through improperly installed fixtures or equipment. A safe water supply in a plant contributes to product purity and to the safety of the workers.

Handwashing facilities, including running water, soap, and sanitary drying facilities, are essential to the personal cleanliness of food-service workers. The posting of a handwashing sign is necessary to remind plant employees of this important public-health practice.

Satisfactory compliance. -- This item will be satisfied when --

a. Plumbing is installed in compliance with State and local plumbing ordinances, or is substantially equivalent to the recommendations contained in the American Standard National Plumbing Code ASA A40.8-1955.

b. There are no cross-connections between the approved pressure water supply and water from a nonapproved source, and there are no fixtures or connections through which the approved pressure supply might be contaminated by back siphonage.

c. There is at least 1 lavatory for every 20 employees among the first 100 employees, and at least 1 lavatory for each 25 employees in excess of the first 100. (Twenty-four lineal inches of wash sink or 18 inches of a circular basin, when provided with water outlets for such space, will be considered equivalent to 1 lavatory.)

d. Handwashing facilities are convenient to the work areas, and are so located that the person responsible for supervision can readily observe that employees wash their hands before beginning work and after each interruption. (Ordinarily, there should be at least one lavatory in the packing room for use by packing-room workers.)

e. The lavatories are provided with hot water (at least 100°F.) either from a controlled-temperature source with a maximum temperature of 115°F., or from a hot-and-cold mixing or combination valve. (Steam-water mixing or steam-water combination valves are not acceptable.)

f. Supplies of soap and single-service hand towels are available near the lavatory. (Other sanitary drying devices, if approved by the State regulatory agency, are also acceptable.)

g. Handwashing signs are posted in toilet rooms and near lavatories.

h. The toilet-room doors are tight-fitting and self-closing.

i. The toilet rooms are kept clean and in good repair.

j. A supply of toilet paper is available in the toilet rooms.

k. At least 5-foot-candle illumination (natural or artificial) is provided in toilet rooms; and toilet rooms are ventilated by a direct opening to the outer air, or by a mechanical ventilating system. (Exhaust fans, if used, should have a minimum capacity of 2 cubic feet a minute per square foot of floor area.) Air vents should be screened or have self-closing louvers.

l. Conveniently located, separate toilets are provided for each sex, excepting that separate facilities need not be required when family shucking is carried on and satisfactory toilets are located nearby, or when the plant has fewer than 10 employees. The number of water closets provided complies with applicable State laws. In the absence of such laws, the following number of water closets should be provided:

Number of Employees	Number of water closets [1]	
	Male	Female
1 to 9	1	1
10 to 24	2	2
25 to 49	3	3
50 to 74	4	4
75 to 100	[2] 5	[2] 5

[1] Wherever urinals are provided, one water closet less than the number specified may be provided for each urinal installed, except that the number of water closets in such cases should not be reduced to less than two-thirds of the minimum specified. A 24-inch trough will be considered equivalent to 1 urinal.

[2] One additional fixture for every 30 employees over the first 100.

m. No drainpipes or wastepipes are located over food processing or storage areas, or over areas in which containers or utensils are stored or washed.

11. SEWAGE DISPOSAL. -- Sewage shall be discharged into public sewers wherever possible. Where private sewage-

disposal systems must be utilized, they shall be constructed according to State and local requirements; provided, that privies shall be accpetable only where water-carriage systems are not feasible. All newly constructed individual water-carriage systems shall be at least equal to the recommendations contained in the "Manual of Septic Tank Practice," Public Health Service Publication No. 526.5 All sewage-disposal facilities shall be so constructed and maintained that waste will be inaccessible to flies and rodents.

Public-health explanation. -- The organisms causing typhoid fever, paratyphoid fever, and dysentery may be present in the body discharges of cases or carriers. When sewage-disposal facilities are of a satisfactory type, there is less possibility that the shellfish being processed may become contaminated with fecal material carried by flies or rodents.

Non-water-carriage sewage-disposal systems should be of a sanitary type, so that excreta are not accessible to flies or rodents.

Satisfactory compliance. -- This item will be satisfied when --

a. Sewage is discharged into public sewers wherever possible.

b. Any private sewage-disposal facilities utilized are constructed and operated so as to comply with State and local requirements and privies are accepted only where water-carriage systems are infeasible. Any newly constructed individual water-carriage systems are at least equal to the recommendations contained in the "Manual of Septic Tank Practice," Public Health Service Publication No. 526.

c. No human excreta are accessible to flies or rodents.

12. RODENT CONTROL. -- Shellfish-processing plants shall be free from rodents.

Public-health explanation. -- Rodents may contaminate the shellfish, utensils, or containers.

Satisfactory compliance. -- This item will be satisfied when --

a. The plant is so constructed as to prevent ready entrance of rodents, and there is no evidence of rodents in any part of the plant.

b. Rodenticides which are highly toxic to humans are not stored in shellfish-processing plants, and are not used except under the supervision of a licensed pest-control operator or other qualified specialist. (Rodenticides which have a low toxicity for humans should be identified, stored, and used in such a manner as to prevent contamination of the product or ingredients, and to cause no health hazards to employees.)

13. CONSTRUCTION OF SHUCKING BENCHES AND TABLES. -- The tops of shucking benches and tables, and contiguous walls to a height of at least 2 feet above the bench top, shall be of smooth concrete, corrosion-resistant metal, or other durable, nonabsorbent material, free from cracks, and so constructed that drainage is complete and rapid and is directed away from the stored shellfish. Shucking blocks shall be easily cleanable. Wooden shucking blocks, if used, shall be of solid, one-piece construction, and shall be easily removable. Shucking blocks of lead or other toxic materials are prohibited. Stands or stalls, if any, shall be of painted, finished material.

Public-health explanation. -- Unless shucking benches, stands, blocks, and stalls are made of smooth material and are easily cleaned, they will become very dirty and may contaminate the shellfish.

Satisfactory compliance. -- This item will be satisfied when --

a. Shucking benches and contiguous walls to a height of at least 2 feet above the bench tops are of smooth concrete, corrosion-resistant metal, or other durable, nonabsorbent material, free from cracks.

b. Benches drain completely and rapidly, and drainage is directed away from any shellfish on the benches.

c. Shucking blocks are easily cleanable; of nontoxic material; of solid, one-piece construction; and, unless an integral part of the bench, are easily removed from the shucking bench. (Lead is acceptable for weighting breaking blocks only where the shellfish or knife will not come into frequent contact with the metal.)

d. Stands (or stalls) and stools are of painted, finished material.

e. Shuckers' stools have no attached padding, and are so constructed as to be easily cleaned.

14. CONSTRUCTION OF UTENSILS AND EQUIPMENT. -- The food-product zone of utensils and equipment, including that used for ice-handling, shall be made of smooth, corrosion-resistant, impervious, nontoxic material which will not readily disintegrate or crack; and the utensils and equipment shall be so constructed as to be easily cleaned, and shall be kept in good repair.

Public-health explanation. -- Colanders, shucking pails, skimmers, blowers, and other equipment or utensils which come into contact with the shucked shellfish and which have cracked, rough, or inaccessible surfaces, or which are made of improper material, are apt to harbor accumulations of organic material in which bacteria or other microorganisms may grow. These microorganisms may later cause illness among those who eat the shellfish, or spoilage in the shucked shellfish.

The slime and foreign material which accumulate in blower airpipes below the liquid level afford an excellent breeding place for bacteria. This material may be dislodged and forced into the batch of shucked shellfish then in the blower, thus increasing the bacterial content of the shellfish.

Satisfactory compliance. -- This item will be satisfied when --

a. All pails, colanders, skimmers, paddles, tables, storage containers, returnable containers, blowers, and other equipment which come into contact with shucked shellfish, or with ice used for direct cooling of shellfish, are constructed of corrosion-resistant, nonabsorbent, nontoxic, smooth material which will not readily crack or disintegrate. (The use of enameled, tinned, or galvanized material in the food-product zone of equipment other than single-service shipping containers is not acceptable.)

b. There are no exposed screw, bolt, or rivet heads in the food-product zones, and all joints in the food-product zone are welded or soldered flush and have a smooth surface. (The use of welded joints which have been ground smooth is recommended, because soldered joints have been proven to be generally unsatisfactory for equipment used in the shellfish industry.)

c. Tanks, tubs, and shucked-stock storage containers are so located that their top rim is at least 2 feet above the floor.

d. All utensils and equipment are in good repair.

e. All equipment, including external and internal blower airlines and/or hoses below a point 2 inches above the overflow level of the tank, and blower drain valves, is so constructed as to be easily cleanable; when perforations in skimmers and colanders are smooth, to facilitate cleaning; when all internal angles in the food-product zone are filleted or otherwise fabricated to have an internal radius of at least 1/4 inch; and when there are no V-type threads in the food-product zone of the blower. (The use of wire mesh in the food-product zone of equipment is not acceptable.)[7] Non-food-product zones of equipment should be so constructed that they can be kept in a clean, sanitary condition; seams and joints should be welded, whenever possible; outside seams should be welded or filled with solder; and there should be no inaccessible spaces in which dirt or organic material might accumulate.

f. The blower drain is not directly connected with a sewer.

g. A stand or shelf constructed of corrosion-resistant material, located so that the rim of the receiving container will be at least 2 feet above the floor, is provided under all chutes from skimmers and blowers, unless blowers discharge directly to a skimmer.

h. Air-pump intakes are located in a protected place.

i. Containers are clean; are fabricated of nontoxic metal, waxed paper, glass, or other impervious material; are so designed and fabricated that the contents will be protected from contamination during shipping and storage; covers of returnable containers are so designed as to protect the pouring lip of the container; and returnable containers are sealed so that tampering can be detected.

j. All blower tanks, skimmers, returnable shipping containers, shucking buckets and pans purchased and/or installed after September 30, 1965, shall comply with the sanitation requirements contained in the Shellfish Industry Equipment Construction Guides published by the Public Health Service. (Copies are available from State shellfish sanitation agencies or PHS regional offices.)

15. GENERAL CLEANLINESS. -- Premises shall be kept clean and free of litter and rubbish. Miscellaneous and unused equipment and articles which are not necessary to plant operations shall not be stored in rooms used for shellstock storage, shucking, packing, or repacking. No domestic animal or fowl shall be permitted to be in a shellfish-

processing plant. The shell-stock storage, shucking, and packing portions of the plant, when in operation, shall be restricted to the handling of shellfish. Unauthorized persons shall be excluded from the plant.

Public-health explanation. -- The presence of unused equipment and material interferes with the proper cleaning of the plant and equipment, and may, therefore, contribute indirectly to contamination of the food product. Shell or shucked stock may be contaminated by domestic animals, fowls, or rodents.

Satisfactory compliance. -- This item will be satisfied when --

a. Material and equipment not in routine use are not stored in rooms used for shell-stock storage, shucking, packing, repacking, or container storage.

b. The shell-stock storage, shucking, and packing portions of the plant are not used for other operations while shellfish are being processed.

c. No domestic animals, rodents, or fowl are permitted in shellfish-processing plants.

d. Only personnel engaged in packing operations, supervisory personnel, authorized inspectors, or other persons specifically authorized by the plant manager, are allowed in the shell-stock storage, shucking, or packing rooms during periods of operation.

e. Premises are clean and free of litter and rubbish.

f. Shuckers do not go into or through the packing room for any purpose. (An exception may be made in small operations, where an employee may work in both the packing room and the shucking room. In such cases, the employee should be required to change aprons and wash his hands thoroughly before entering the packing room.)

16. CLEANING OF BUILDINGS AND EQUIPMENT. -- Shucking benches, shucking stools, floors, and, if necessary, walls of the shell-stock storage rooms and packing and shucking rooms shall be cleaned within 2 hours after the day's operations have ceased. Windows and skylights shall be kept clean. Refrigerators shall be kept clean. All equipment, utensils, and work surfaces, including the external and internal blower airlines and blower drain valves, shall be cleaned by scrubbing with water and detergent and rinsing with potable water within 2 hours after the day's operations have ceased.

Public-health explanation. -- Clean work-rooms and refrigerators reduce the chance of contaminating shellfish during shucking and processing. Shucked shellfish cannot be kept clean and safe if permitted to come into contact with equipment which has not been sanitized. Bactericidal treatment is not effective unless the equipment is first thoroughly cleaned.

The determination of adequate cleanup facilities will depend upon the method of bactericidal treatment selected (see Item 17) and plant-by-plant determination of what equipment and utensils may best be washed in a sink and what equipment may best be washed "in place." Detergents and brushes, including special brushes that may be needed for cleaning equipment such as blower lines, should be available.

SINK WASHING

Wash sinks should be made of impervious nontoxic material. Sink compartments should be large enough to permit the complete immersion of the largest utensil to be sink-washed. A second compartment should be provided in the sink for clean-water rinsing between washing and bactericidal treatment, unless some other acceptable method, such as a spray rinse, is provided. In the case of bactericidal treatment by immersion in hot water (item 17a(2), both the bactericidal treatment and rinse may be accomplished simultaneously in the second compartment. If bactericidal treatment by means of immersion in chemical solutions (Item 17a(3)), is selected, a separate compartment should be provided for this operation.

NUMBER OF COMPARTMENTS REQUIRED IN SINK

Method of bactericidal treatment	Method of rinse	
	Immersion	Spray
Steam cabinet	2	1
Hot water (170°F.)	2	(1)
Bactericidal solution	3	2

(1)Not applicable.

IN-PLACE WASHING

Utensils and equipment which have to be washed "in place" will require the same three steps of wash, rinse, and bactericidal treatment. A watertight container, such as a blower tank, is best washed by preparing a solution of the detergent in the container itself and using this to scrub all parts of the unit. Rinsing, preferably, should be accomplished either by complete filling or by thorough spray rinse. The bactericidal treatment methods are described in item 17.

Satisfactory compliance. -- This item will be satisfied when --

a. Shell-stock storage, shucking, and packing rooms are cleaned within 2 hours after the day's operations have ceased.

b. All utensils, equipment, and work surfaces, including the external and internal blower airlines below the tank's liquid level, are cleaned by scrubbing with water and detergent and rinsing with potable water within 2 hours after the day's operations have ceased.

c. Cleaned benches, blocks, and stalls are flushed or sprayed as often as necessary, and at least once each week, with a solution containing not less than 100 parts per million of available chlorine, or other disinfecting agents in effective concentrations as approved by the State regulatory authority.

d. Refrigerators are clean.

e. Adequate cleanup facilities, including sinks, bactericides, detergents, and brushes, are available within the plant. Where chemical bactericides are used, a third compartment or spray rinse must be installed to permit a clean-water rinse between washing and bactericidal treatment. (Sink compartments should be large enough to permit complete immersion of the largest utensil to be washed.)

f. All shelves, tables, and other equipment in the shucking and packing rooms are clean.

g. Wash tanks, blowers, and containers for shucked-stock holding are flushed or spray-rinsed with tap-water after each emptying. (Dismantling is not necessary.) Periodic clean-water flushing of shucking benches, utensils, table surfaces, and other equipment during working periods is recommended.

17. BACTERICIDAL TREATMENT OF UTENSILS AND EQUIPMENT. -- All utensils and equipment in the shucking and packing rooms which come into contact with shucked shellfish shall be subjected to an effective bactericidal process at the end of each day's operation.[8]

Large equipment which might be recontaminated before use shall be cleaned at the end of each day's operation, and shall be subjected to effective bactericidal treatment immediately before use.

Returnable shipping containers, if used, are subjected to an effective bactericidal treatment process on the day they are to be used, and are protected against contamination until filled.

Amounts of Chlorine Compounds Required To Give Approximately 100 p.p.m. of Chlorine by Readily Available Measuring Devices

Volume of water (gallons)	Dry chlorine compounds—available chlorine			Liquid hypochlorite solutions—available chlorine	
	15 percent	*25 percent*	*70 percent*	*1 percent*	*5 percent*
20	5½ tbs	3½ tbs	1½ tbs	3 cups	10 tbs.
40	11 tbs	6½ tbs	2½ tbs	3 pts	1¼ cups.
60	1 cup	10 tbs	3½ tbs	4¾ pts	2 cups.
80	1⅖ cups	13½ tbs	4½ tbs	6½ pts	2½ cups.
100	1⅘ cups	1 cup	6 tbs	4 qts	3 cups.
150	2¾ cups	1½ cups	9 tbs	6 qts	4¾ cups.
200	3⅗ cups	2 cups	12 tbs	2 gals	3 pts.

NOTE

Dry measure

1 tablespoon (tbs.)—approximately 0.3 ounce.
1 cup or ½-pint—approximately 5 ounces.

Liquid measure

1 tablespoon or 3 teaspoons—approximately 15 milliliters.
1 cup or ½-pint—approximately 16 tablespoons.

Public-health explanation. -- Shellfish furnish an excellent growth medium for bacteria or other microorganisms. Small numbers of bacteria which might remain on improperly sanitized equipment may multiply to tremendous numbers in the finished pack.

Satisfactory compliance. -- This item will be satisfied when --

a. All utensils and other equipment have been treated by one or more of the following methods:[9]

(1) Exposure for at least 15 minutes at a temperature of at least 170°F., or for at least 5 minutes at a temperature of at least 200°F., in a steam cabinet equipped with an indicating thermometer[10] located in the coldest zone. (Absence of a thermometer violates this item.)

If steam is used in the bactericidal treatment of blowers, a suitable cover and indicating thermometer are provided. A vent or valve should be installed at the bottom of large steam cabinets, to permit the discharge of cold air when steam is admitted.[11]

(2) Immersion in hot water of at least 170°F., for at least 1/2 minute. (An accurate indicating thermometer is provided and used.[10] [11] Ordinarily, a booster heater is necessary for water to be maintained

at 170°F.)

In the bactericidal treatment of blowers by this method, the blower may first be filled with water and then brought up to 170°F. by the addition of steam. This temperature should be checked by the indicating thermometer, and the 1/2-minute contact period measured after reaching this value. In practice it has been found desirable to provide a connection to, or a removable section in, the blower line above the liquid level of the tank, where steam or hot water can be introduced.

(3) Immersion for at least 1 minute in, or exposure for at least 1 minute to, a flow of a solution containing not less than 50 parts per million of free chlorine. All product-contact surfaces must be wetted by the bactericidal solution, and piping so treated must be filled. Bactericidal sprays containing not less than 100 parts per million of free chlorine may be used for large equipment. Bactericidal treatment with chemicals is not effective unless the surface has been thoroughly cleaned.

Bactericides other than chlorine should not be accepted by the inspector until official tests by the proper regulatory authority have demonstrated that the bactericide in question is satisfactory for use in connection with shellfish sanitation. The local inspector should consult his State health organization regarding other bactericides in use in his area, so that he may be certain he is using the proper tests for effectiveness and concentration.

b. Large items which cannot be stored in a protected place are given effective bactericidal treatment immediately before starting each day's operation.

18. STORAGE OF EQUIPMENT. -- Equipment and utensils which have been cleaned and given bactericidal treatment shall be stored so as to be protected against contamination.

Public-health explanation. -- The results of cleaning and bactericidal treatment may be negated by improper storage of the treated equipment.

Satisfactory compliance. -- This item will be satisfied when the treated equipment is stored where it will be protected from contamination or unauthorized handling. (The utensils may be stored in the steam chest, in a special cabinet, or in the packing room on clean shelves, stands, tables, or racks. Storage racks should be at least 2 feet above the floor.)

19. SOURCE OF SHELLFISH. -- All shellfish shall be obtained from a source approved by an official regulatory agency.

Public-health explanation. -- The positive relationship between sewage-polluted shellfish and enteric disease has been demonstrated many times. The bacterial content of shellfish will, in general, mirror the bacterial quality of the water in which they have grown. Because shellfish pump and filter a large quantity of water, the bacteria count of the shellfish will normally exceed the bacteria count of the water in which they frow. The shellfish-water bacteria ratio depends upon the shellfish species, water temperature, presence of certain chemicals, and varying capabilities of the individual animals. If the water in which the shellfish are grown contains sewage, it may be assumed that the shellfish will also contain sewage bacteria or viruses, some of which may be capable of causing disease in man.

Furthermore, there is evidence that organisms of the Salmonella group, at least, will survive in shellfish for a considerable length of time after harvesting. Kelly and Arcisz ("Survival of Enteric Organisms in Shellfish," Reprint No. 3249, vol. 69, no. 12, Dec. 1954, pp. 1205-1210, Public Health Reports) have shown that viable S. schottmuelleri will persist for at least 49 days in shell oysters, Crassostrea virginica, stored at a temperature of 40°F. However, there was little evidence of multiplication of the bacteria in the shellfish during the storage period. In the same study, it was reported that S. schottmuelleri persisted in soft clams, Mya arenaria, stored at a temperature of 40°F., throughout a normal storage period.

Other public-health hazards may result from the presence of a naturally occurring paralytic shellfish poison in certain species of shellfish. The occurrence of this poison is apparently related to the concentration of a dinoflagellate, Gonyaulax, in the water of the growing area. Species of shellfish which may accumulate this poison under appropriate conditions include Mytilus californianus, Mytilus edulis, Mya arenaria, Saxidomus gigantius, Donax serra, and Modiola modiolus. The poison occurs only in well-defined areas and, in some instances, only during certain season. It is not widespread over all shellfish-producing areas.

Cooking does not insure safety of shellfish since, in ordinary cooking processes, shellfish may not be sufficiently heated to insure a kill of pathogenic organisms, although a considerable reduction will take place. One investigator has found that oysters must be held in a water bath at 138°-142°F. for 1 hour before the coliform count is reduced to zero. (See Salafranca, E. S., "The Effect of Salt, Vinegar, and Heat on the Coliforms in Oysters," The Philippine Journal of Fisheries, vol. 2, no. 1, 1953.) Also, normal cooking processes cannot be relied upon to destroy paralytic shellfish poison if it should be present.

The primary safeguard in the entire shellfish sanitation program is, therefore, that of obtaining shellfish which are free of disease-causing organisms, and which contain, at most, only relatively small quantities of poison. If shell-stock from sewage-polluted or highly toxic areas are shucked, then almost all of the other sanitary safeguards of the cooperative certification program will have been circumvented.

Satisfactory compliance. -- This item will be satisfied when all shellfish are obtained from one or more of the following sources: (a) An approved growing area; (b) a State-certified shellfish shipper; or (c) a State-approved shellfish-treatment plant.

20. REFRIGERATION OF SHELL-STOCK. -- Shell-stock of shellfish species which have poor keeping qualities (such as the soft-shell clam, Mya arenaria, and the mussels, Mytilus edulis and Mytilus californianus) shall be refrigerated during shipment and holding.

Public-health explanation. -- If shell-stock of shellfish species which have poor keeping qualities are not refrigerated during prolonged storage, the quality of the product will be impaired and the bacteria counts will be increased.

Significant increases in coliform counts in shell oysters stored overnight may also occur under some conditions.

Satisfactory compliance. -- This item will be satisfied when --

a. Shell-stock of shellfish species with poor keeping qualities are stored at a temperature of 50°F. or less, but are not frozen, and when, at points of transfer, such as loading docks, shell-stock are not permitted to remain unrefrigerated for prolonged periods.

b. Shell-stock are protected from the sun during warm weather to the extent necessary to prevent spoilage.

21. SHUCKING OF SHELLFISH. -- Shellfish shall be shucked in such a manner that they are not subjected to contamination. Shell-stock shall be reasonably free of mud when shucked.[12] Only live shellfish shall be shucked.

Water used in fluming or washing shell-stock shall be from a source approved by the State regulatory agency. Use of overboard water must be specifically approved by the State agency, and its use limited to shell-stock washing.

Public-health explanation. -- If shellfish are not reasonably clean at the time of shucking, a considerable quantity of the adhering material will be mixed into the shucked shellfish during the shucking process, thus contributing to high bacteria counts in the final product. (See Public-health explanation, Section A, Item 2, Washing of

Shell-Stock.)

The bacteria count of the final pack is related to the time intervening between shucking and attainment of a temperature of approximately 45°F., i.e., the length of time the shellfish are at a temperature favorable to the rapid growth of bacteria. Factors in the shucking-room procedure which influence the length of time shucked shellfish are above 45°F. include the quality and species of the shellfish being shucked, the speed of the individual shucker, the practice of returning "overage" or "bluff" to the shuckers, the frequency with which the shucking containers are delivered to the packing room, the air temperature, and the temperature of the shell-stock being shucked.

The total elapsed time which shellfish may be held on the shucking bench without causing high bacteria counts is closely related to the packing-room procedures, the size of containers into which the shucked shellfish are being packed, the temperature of blower water, the temperature of the oysters, and the method of cooling.

From the standpoint of bacteriological quality, it is preferable that the elapsed time between shucking and the attainment of a temperature of 45°F. not exceed 4 hours. More rapid cooling is very desirable.

The return of overage (bluff) from the packing room to the shucker would ordinarily result in at least a portion of the shellfish being held on the shucking bench for more than 2 hours and would permit an undesirable growth of bacteria. When bench grading of shellfish is practiced, it is especially important that all grades of shellfish be delivered to the packing room at least once every 2 hours when the temperature of the shellfish exceeds 45°F. To encourage frequent delivery of the shucked shellfish to the packing room, it is suggested that the shucking containers be limited to a size that an average shucker might reasonably be expected to shuck full in 1 hour.

Storage of shucked shellfish on the shucking benches for long periods of time increases the possibility of contamination of the shucked shellfish by splash or flies.

Bacteriological examination of the water in dip buckets has shown very high coliform counts. Since water from the dip bucket may be carried over into the shucked shellfish, there is a need for controlling the sanitary quality of the water.

Satisfactory compliance. -- This item will be satisfied when --

a. Water used for fluming or washing shell-stock is obtained from a source approved by the official State regulatory agency.

b. Shell-stock are reasonably free of mud when shucked.

c. Only live shellfish are shucked.

d. The use of "dip" buckets is prohibited. (Where conditions dictate the need for frequent rinsing of the shucker's hands and knife, it is recommended that water outlets be installed at the shucking bench convenient to each shucker, or that a flow-through type of dip bucket, in which the water is continually replaced by clean tapwater, be installed.)

e. Shucking containers are rinsed with running tapwater before each filling.[13]

f. The return of overage (bluff) from the packing room is not permitted.

22. SHELL DISPOSAL. -- Shells from which meats have been removed shall be removed promptly from the shucking room.

Public-health explanation. -- Shell accumulations in the shucking room make it difficult to keep the room clean, and the chances of contaminating the shucked product are increased.

Satisfactory compliance. -- This item will be satisfied when shells are promptly removed from the shucking room to prevent interference with the sanitary operation of the plant. Any method of shell removal which results in the prompt removal of shell without contaminating the shucked product is acceptable. These methods include, but are not limited to, conveyors, baskets, barrels, wheelbarrows, or shell drop-holes. (It is recommended that unused portions of body meats, such as clam siphons, not be disposed of with shells. Fly-control measures may be necessary in the vicinity of shell piles.)

23. HANDLING OF SINGLE-SERVICE CONTAINERS. -- All single-service containers shall be stored and handled in a sanitary manner and, where necessary, shall be given bactericidal treatment immediately prior to filling.

Public-health explanation. -- Single-service containers which have not been stored and handled in a sanitary manner may become contaminated and thus may contaminate the packaged shellfish.

Satisfactory compliance. -- This item will be satisfied when --

Single-service containers and covers are kept in original cartons until used, and are kept clean and dry.

b. Containers which may have been contaminated during storage are cleaned and given bactericidal treatment immediately prior to filling, or are discarded.

c. Plant employees use every reasonable precaution to prevent the food-contact surfaces of containers from coming into contact with their person or clothing.

d. Container-storage rooms are kept clean and free of rodent or insect infestation; containers are so stored that the presence of rodents may be easily detected;[14] and container-storage rooms are not used as general storerooms for unused equipment and materials.

e. Single-service containers in the packing rooms are kept on stands or tables at least 2 feet above the floor, and are protected against contamination from splash.

24. PACKING OF SHUCKED SHELLFISH. -- Shucked shellfish shall be packed without exposing them to contamination. Shucked shellfish shall be packed and shipped in clean, single-service containers made of impervious materials, or in clean, properly designed, returnable containers[15] so sealed that tampering can be detected. Each individual package of fresh or frozen shellfish shall have permanently recorded on the package or label, so as to be easily visible, the packer's repacker's or distributor's name and address, and the packer's or repacker's certificate number preceded by the abbreviated name of the State. Containers holding 1 gallon or more shall have the identification on the container wall, unless the cover becomes an integral part of the container during the sealing process.

Each shucker packer and repacker shall legibly code-date each package of fresh and frozen shucked shellfish to indicate the date of packing or repacking. (A recommended code-dating system is included in Appendix B.)

Public-health explanation. -- Unless shucked shellfish are packed in clean containers, all precautions taken to produce a clean and safe product may be negated.

The State permit number facilitates tracing the product to the plant in which it was actually prepared. The date or code on the product further assists the regulatory authority in tracing shellfish to their point of origin.

Satisfactory compliance. This item will be satisfied when --

a. Skimmer tables are so located that they will not receive drainage from the delivery window.

b. Shuckers do not place shucking containers on skimmers.

c. Shellfish are not exposed to contamination during packaging.

d. Containers are closed as soon after filling as is feasible.

e. The name and address of the packer, repacker, or distributor, and the certificate number, preceded by the abbreviated name of the State, of the packer or repacker, are permanently recorded on the package so as to be easily visible. Wording, such as "Packed for" or "Distributed by," is used wherever necessary to clarify the name on the label. Containers holding 1 gallon or more have the identification on the side wall, rather than on the cover, unless the cover becomes an integral part of the container during the sealing process.[16] (The presence of containers or covers with a plant number other than that on the unexpired certificate for the plant will be considered a violation of this item. Packing into containers with other plant certification numbers is not permitted. Recording identification information on containers by use of a rubber stamp will not be acceptable for compliance with this item.) Returnable shipping containers may be identified with tags of at least 2-5/8 x 5-1/4 inches in size and made of substantial waterproof stock.

f. Each container or package of fresh or frozen shucked shellfish of the shucker packer or repacker has legibly recorded on the label or package, code symbols giving the date of packing, or if repacked, the date of repacking: Provided, that this requirement shall not apply to returnable containers.[15] Such code dating of frozen shellfish need not be on the outer wrap. (The packaging code shall be made available at the request of the State shellfish-regulatory authority.)

25. REFRIGERATION OF SHUCKED SHELLFISH. -- Shucked shellfish shall be cooled to an internal temperature of 45°F. or less within 5 hours after shucking. Storage

temperatures shall not exceed 45°F. Storage at 34°-40°F. is strongly recommended.

A temperature of 0°F. or less shall be maintained in the frozen-storage rooms.

Public-health explanation. -- Shucked shellfish are an excellent medium for the growth of bacteria. Thus, it is very important that the packaged shellfish be cooled promptly, so that bacteria will not multiply. Also temperatures above 45°F. may accelerate physical deterioration and spoilage of shucked stock. Alternate freezing and thawing of shellfish may cause deterioration and spoilage.

Research by the Public Health Service with Crassostrea virginica and Crassostrea gigas stored in ice and at 37.5°F. sustained slight increases in coliform MPN's during the first 5 days of storage. After the storage period of 5 days, there was a continuous increase in MPN values until the 25th day, at which time the coliform MPN's exceeded the original values by at least 50 times. Oysters from the same lots stored at 50°F. sustained a continuous increase in coliform MPN's exceeding 1,000 times the original count within 5 days. In the same studies oysters stored in ice and at 37.5°F. sustained only slight increases in standard plate counts after being stored for 5 days. However, with a storage temperature of 50°F. the same oysters sustained plate count increases which exceeded 180 times their original count within 5 days.

The fecal coliform MPN's decreased slightly from their original MPN values during storage in ice, at 37.5°F. and at 50°F., with the exception that there was a frequent increase in fecal coliform MPN's at the 50°F storage temperature. (See Time and Temperature Effects on Stored Oysters, by C. B. Kelly, Proceedings 1964 Shellfish Sanitation Workshop, available from Shellfish Sanitation Branch, Public Health Service Department of Health, Education, and Welfare, Washington, D. C., 20201.) Appendix B contains charts, figures 1, 2, and 3, which present the above information in graphic form. Appendix B also contains in graphic form the length of time necessary to cool oysters in various size containers to 40°F. under dry refrigeration and in crushed ice.

Satisfactory shellfish. -- This item will be satisfied when --

a. Shucked shellfish are cooled to an internal temperature of 45°F. or less within 5 hours after shucking, and are stored and shipped under similar temperature conditions.

b. Packaged shellfish to be frozen are properly stacked to insure rapid freezing, and are frozen at an ambient air temperature of 0°F. or less, with packages frozen solid within 12 hours after the start of freezing; and frozen shellfish are handled in such a manner as to remain frozen solid, and are held at 0°F. or less.[17]

c. All containers holding shucked shellfish shall be kept covered while under refrigeration.

26. ICE. -- Ice shall be obtained from a source specifically approved by the State regulatory agency, and shall be stored and handled in a clean manner.

Public-health explanation. -- Ice may become contaminated during freezing or in subsequent storing and handling.

Shucked shellfish packed in non-hermetically sealed containers may also be contaminated by dirty ice. When containers of shellfish are stored in ice, a partial vacuum is formed within the container which may draw water from the melting ice into the container.

Satisfactory compliance. -- This item will be satisfied when --

a. Ice is manufactured in an establishment or machine approved by the proper State regulatory authority.

b. Ice is stored and handled in such a manner that it will not be contaminated.

c. Ice, other than that manufactured in the shell-fish processing establishment, is washed before use.

27. RECORDS. -- Complete and accurate records

shall be kept by every shellfish dealer.

Public-health explanation. -- In case of an outbreak of disease attributable to shellfish, it is necessary that health departments be able to determine the source of contamination, and thereby to prevent any further outbreaks from this source. This can be done most effectively by following the course of a shipment, through all the various dealers who have handled it, back to the point of origin by means of records kept by the shellfish dealers.

Satisfactory compliance. -- This item will be satisfied when each shucker-packer, repacker, shell-stock shipper, or reshipper establishes and maintains a ledger record or record system satisfactory to the State control agency indicating from whom shellfish were purchased or secured; the date purchased or secured; State designated areas from which the shellfish were harvested; and the names and addresses of persons to whom shellfish were sold. (An example ledger form is contained in App. B.)

28. HEALTH OF PERSONNEL. -- Any person known to be infected with any disease in a communicable form, or to be a carrier of any disease which can be transmitted through the handling of shellfish, or who has an infected wound or open lesion on any exposed portion of his body, shall be excluded from the shucking or packing plant. An owner or manager who has reason to suspect that any employee

has contracted a communicable disease shall immediately notify the proper health officials. Pending appropriate action by the health officials, said employee shall be excluded from the plant.

Public-health explanation. -- Persons who are infected with, or who are carriers of, organisms of typhoid fever, dysentery, septic sore throat, or certain other communicable diseases, might transmit such disease to others through shucked shellfish. A person with an infected wound or open lesion on the exposed portion of his body might transmit toxin-producing bacteria to the shucked shellfish, and thus cause food poisoning to consumers thereof.

Careful, daily observations of the health of employees, with proper inquiries when indicated, and exclusion of employees who are ill, will tend to prevent possible contamination of the shucked stock with pathogenic organisms.

Satisfactory compliance. -- This item will be satisfied when --

a. Persons with infected wounds or open lesions on the exposed portion of their bodies, and those who are known to be carriers of, or infected with, typhoid fever, dysentery, or other communicable diseases likely to be transmitted by shucked shellfish, are excluded from the plant.

b. Daily observations of employees are made by the supervisor, with reasonable inquiries being made when signs of illness appear.

c. Upon an inquiry indicating the possibility of a communicable disease, the ill employee is excluded from the plant pending clearance by the health officials.

d. Employees having diarrhea or sore throat promptly report this to the manager.

29. SUPERVISION. -- The management shall designate a reliable individual to be accountable for compliance with the items of this manual having to do with plant and personal cleanliness.

Public-health explanation. -- Handwashing by food-service employees is a very important public-health measure. Unless someone is made specifically responsible for this practice, it is apt to be forgotten or overlooked. Similarly, one person must be responsible for plant clean-up. Clean floors, walls, and benches reduce the chance of contamination of the shellfish or utensils during shucking or packing operations. Periodic disinfection of the plant will reduce the possibility of conaminating the shellfish.

Satisfactory compliance. -- This item will be satisfied when a reliable individual has been designated by the management to supervise the activities enumerated in

Section B, Items 16, 28, and 30, and when there is evidence that he has been executing these duties. Designation of such an individual does not relieve management of responsibility for compliance with these items.

30. CLEANLINESS OF EMPLOYEES. -- Employees shall wash their hands with soap and water before beginning work, and again after each interruption. (Supervision of handwashing is a specific responsibility of management, Section B, Item 29.)

When manual handling of shucked shellfish becomes necessary, sanitized rubber gloves shall be worn, or the hands shall be washed and disinfected immediately before such manual handling.

Finger cots, gloves, and/or shields, if worn by shuckers, shall be sanitized as often as necessary and at least twice daily. (Use of water-proof finger cots or shields is recommended as preferable to those made of an absorbent material.) Any person who handles shucked shellfish shall wear a clean apron or coat.

Employees shall not use tobacco in any form in the rooms in which shellfish are shucked or packed.

Public-health explanation. -- The hands of all employees frequently come into contact with their clothes; hence, it is important that the clothes worn during the handling of shucked shellfish be clean. The nature of the work makes it necessary that protective outer garments be worn. Finger cots, gloves, and/or shields, unless sanitized periodically, will accumulate bacteria which will contaminate the shucked shellfish.

Disease of toxin-producing bacteria may be carried on the hands of shuckers and/or packers; hence, handwashing is very important.

Satisfactory compliance. -- This item will be satisfied when --

a. Clean aprons or coats are worn by any persons handling shucked shellfish.

b. Aprons or coats not in use are stored in a room or locker provided for this purpose.

c. Finger cots, gloves, and/or shields, if worn by shuckers, are sanitized as often as necessary and at least twice daily, and are properly stored until used. (See Section B, Item 18.)

d. Sanitized rubber gloves are worn during, or the hands are washed and disinfected immediately before, any manual handling of the shucked shellfish. (A bucket or pan of the bactericidal solution should be present in the packing room during periods of operation.)

e. There is no evidence of spitting, or of the use of any form of tobacco, by employees in rooms in which shellfish are shucked or packed.

f. Employees wash their hands with soap and water before beginning work and after each interruption, and utensil sinks are not used for handwashing.

(Footnotes to Section B:

[1] Foot-candles of illumination

[2] This publication is obtainable from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., 20402; price 40 cents.

[3] The regulatory agency should collect water samples for bacteriological examination at not less than semi-annual intervals if the supply should be from a private source. In addition, samples for bacteriological examination should be collected from all new private sources of supply before they are used, and from repaired supply facilities after they have been disinfected. Bacteriological examination shall be made in conformity with the standard methods recommended by the American Public Health Association.

[4] This publication is obtainable from the American Society of Mechanical Engineers, 29 West 39th St., New York, N. Y.

[5] This publication is obtainable from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., 20402; price 40 cents.

[7] Sanitary Standards describing the construction of valves, fittings, and pumps may be obtained from International Association of Milk and Food Sanitarians, Inc., Box 347, Shelbyville, Ind. Public Health Service Publication No. 943, Shellfish Industry Equipment Construction Guides, obtainable from PHS regional offices, contains guides for sanitary construction of shellfish blower tanks, skimmers, returnable shipping containers, and shucking buckets and pans.

[8] Containers which have been subjected to bactericidal treatment should have a residual bacterial plate count of not more than 1 per milliliter of capacity, and equipment not over 50 colonies per 8 square inches (i.e., 1 per square cm.) of food-contact surface, in 3 out of 4 samples. (See Standard Methods for the Examination of Dairy Products for information on apparatus and procedure for making rinse and swab counts.)

[9] In medium and large shucking plants, a steam cabinet with auxiliary steam boiler is a most satisfactory type of equipment for bactericidal treatment of utensils and equipment.

[10] Thermometers should be accurate to within 2°F., should have scale divisions not greater than 2°F., and should be so installed as to be easily read. Accuracy of thermometer should be checked at least once each year by the State

regulatory agency.

[11] Steam or hot-water treatment shall not be accepted as satisfactory compliance unless the equipment or containers are completely immersed or completely exposed for the required time or longer, at the required temperature or higher, throughout the period of exposure.

[12] The primary responsibility for washing the shellfish free of mud is placed on the harvesters. However, this does not relieve the plant operator of responsibility for compliance with this item. (See Section A, Item 2.) Bacteria counts of mud from Tangier Sound averaged about six times higher than bacteria counts of oysters from the same growing area. See "Bacteriological Survey of an Oyster Bed in Tangier Sound, Maryland" by M. W. Vaugn and A. W. Jones. Chesapeake Science, Vol. 5, no. 4, Winter 1964.

[13] Food and Drug Administration requirements limit the amount of water in the shucking containers to one-fourth of the capacity of the container.

[14] Containers should be stored on open racks or pallets at least 8 inches above the floor and 18 inches away from the walls.

[15] Returnable containers will be accepted only for interplant shipment of shucked shellfish.

[16] Additional information on product quality, quantity and identification may be required by Federal

and/or State laws.

[17] It is recommended that freezing and frozen-storage compartments be equipped with at least the following equipment: (1) Automatic temperature-regulating control; (2) an indicating thermometer, so installed as to indicate accurately the temperature within the storage compartment; and (3) except for plate freezers, a recording thermometer installed on each freezing or storage compartment in such a manner as to record accurately the temperature within the compartment at all times. Recording-thermometer charts should be retained for at least 1 year.)

SECTION C

PACKING AND SHIPPING SHELL-STOCK

A shell-stock shipper deals only in shellfish which are still in the shell; hence, his plant sanitation requirements are not as extensive as those of a shucker-packer or repacker. A shipper holding only a shell-stock certificate shall not shuck shellfish or repack shucked shellfish. Operators of "buy" boats and "buy" trucks shall be considered shell stock shippers.

Shellfish in the possession of a shell-stock shipper shall be protected against contamination. The shell-stock shipper shall keep records of his purchases and sales, and shall tag shell-stock shipments so that they may be identified.

To effectuate the needed sanitary safeguards, the shell-stock shipper shall comply with items 1 and 2 below, and with the items of sections A and B indicated for each type of shell-stock operation in table II.

1. WASHING OF SHELL-STOCK. -- Shell-stock shall be reasonably free of mud at the time of shipment.

Public-health explanation. -- See Section A, Item 2, concerning reasons for washing shellstock. If shellfish are washed in polluted water, the shellfish may be contaminated. Therefore, water used for shell-stock washing should be of approved sanitary quality. Preferably, shell-stock should be washed at the time of harvesting or as soon thereafter as is feasible.

Satisfactory compliance. -- This item will be satisfied when --

a. Shell-stock are reasonably free of mud at the time of shipment. The qualifications applicable to washing of shell-stock under Section A, Item 2a, also apply to this item.

b. Water used for shell-stock washing is from a source approved by the official State regulatory authority.

2. PACKING AND SHIPPING OF SHELL-STOCK. -- Shell-stock shall be packed and shipped in clean containers, under conditions which will prevent contamination. When

TABLE II

Shell-stock operation type	Applicable item—sec. A		Applicable item—sec. B											
	1	3	1	3	9	10	11	12	15	19	20	25	27	28
Shore establishment † buys, stores, packs.	—	—	X	X	a	a, d, f, g, h, i, j, k, m*	X	X	a, c, d, e	X	X	X**	X	X
Harvests or Buy Boats, all operations on boat.	X	X	—	—	—	—	—	—	a, c, d	X	X	—	X	X
Buy Trucks, all operations on truck.	e, c, f	—	—	—	—	—	—	—	a, c, d	X	X	—	X	X

*= Item b also applies to pressure systems.

**= Applies if shucked shellfish are handled.

†= If shore establishment operates boats or trucks, requirements for Buy Boats and Buy Trucks are also applicable.

X = Required.

— = Not required.

consigned in bulk, shell-stock shall be shipped in clean conveyances, under conditions which will prevent contamination.

Shell-stock in transit shall be identified by a tag or label fastened to each shipping container and bearing the number of the shipper, his name and address, the name and address of the consignee, and the kind and quantity of shell-stock in the container. The following classes of shell-stock shippers shall be exempt from this requirement: Harvesting Only; Buy Boats; and Buy Boats with Storage on the Boats.

Public-health explanation. -- Shellfish must be protected during shipment to avoid contamination and spoilage. Shipments must be tagged, to make it possible for the control authorities to identify shipments of shellfish.

Satisfactory compliance. -- This item will be satisfied when --

a. Shipping containers and vehicles are clean.

b. Tags at least 2-5/8 by 5-1/4 inches in size, and made of substantial, waterproof stock, and carrying the name, address, and number of the dealer, the name and address of the consignee, and the kind and quantity of the shell-stock, are securely fastened to each individual container of shell-stock. (Bulk shipments, "e.g., unpackaged," of shell-stock to a certified shipper require only a single tag or bill of lading which gives the required information.)

SECTION D

REPACKING OF SHELLFISH

The packaging of shucked shellfish in plants other than those in which they were initially shucked exposes the shucked shellfish to additional handling and increases the possibility of contamination. Combining in one pack shucked shellfish from more than one dealer permits the possibility of contamination of the entire pack if shellfish from any one of the dealers should be contaminated. When repacking is practiced, tracing of shellfish to the source is difficult.

When repacking is practiced, it shall be done in accordance with the requirements of table III and the items which follow in this section.

TABLE III

Item number in Section B	Item	Applicable satisfactory-compliance items
2	Plant arrangement	a, d, and e.
4	Floors	all items.
5	Walls and ceilings	all items.
6	Fly-control measures	all items.

TABLE III
(Continued)

Item number in Section B	Item	Applicable satisfactory-compliance items
7	Lighting	all items.
8	Heating and ventilation	b.
9	Water supply	all items.
10	Plumbing and related facilities	all items.
11	Sewage disposal	all items.
12	Rodent control	all items.
14	Construction of utensils and equipment	all items.
15	General cleanliness	all items.
16	Cleaning of buildings and equipment	a, b, d, e, f, and g.
17	Bactericidal treatment of utensils and equipment	all items.
18	Storage of equipment	all items.
19	Source of shellfish	all items.
23	Handling of single-service containers	all items.
24	Packing of shucked shellfish	c, d, e, f, and g.
26	Ice	all items.
27	Records	all items.
28	Health of personnel	all items.
29	Supervision	all items.
30	Cleanliness of employees	a, b, d, e, and f.

1. SHUCKED SHELLFISH INTENDED FOR REPACKING. -- Shucked shellfish to be repacked shall be received at the repacking plant in approved shipping containers at a temperature of 45°F. or less. Frozen shellfish which have thawed shall not be repacked or repackaged.

Public-health explanation. -- Shellfish which are not shipped in properly sealed, easily cleanable containers may become contaminated. Shellfish which have not been properly refrigerated may have excessively high bacteria counts.

If frozen shellfish are thawed during repacking, high bacteria counts in the final pack may result.

Satisfactory compliance. -- This item will be satisfied when --

a. All shucked shellfish are received in properly designed[19] containers. (Returnable containers should be so sealed that any tampering will be evident.)

b. Shellfish are received at a temperature of 45°F. or less. Frozen shellfish which have thawed are not repacked or repackaged.

2. REFRIGERATION DURING REPACKING. -- The temperature of the shellfish shall not exceed 45°F during the repacking process. Frozen shellfish shall not be thawed during the repacking process.

Public-health explanation. -- Bacteria multiply rapidly at high temperatures, but are unable to do so at low temperatures. Adequate cooling, therefore, helps to produce a low bacteria count in the final product.

Satisfactory compliance. -- This item will be satisfied when --

a. The internal temperature of nonfrozen shellfish being repacked does not exceed 45°F. during the repacking process. (This may be accomplished by expeditious handling, by continuous refrigeration of the shellfish being repacked, or by the provision of a refrigerated room for the repacking operation.)

b. Frozen shellfish are not thawed during the repacking process.

3. CLEANING OF RETURNABLE SHIPPING CONTAINERS. -- Returnable shipping containers shall be thoroughly cleaned as soon after emptying as is practicable.

Public-health explanation. -- Containers are most easily cleaned before the organic material has had time to dry.

Satisfactory compliance. -- This item will be satisfied when returnable shipping containers are thoroughly cleaned as soon after emptying as is practicable.

(Footnote for Section D:

[19] See Section B, Item 14.)

SECTION E

RESHIPPERS

Persons who reship shellfish from certified shell-stock shippers, shucker-packers, or repackers to other certified shippers or to final consumers should be licensed and certified as reshippers. Use of this shipper classification is left to the option of the State.

(A reshipper is not permitted to shuck shellfish, nor to repack shucked shellfish.) Requirements for a reshipper depend upon the type of product handled and the methods of operation. If shell-stock are handled, the applicable requirements outlined for a shell-stock dealer must be met (Sec. C).

If only shucked shellfish are handled, the required items are --

1. Section B, Item 19, "Source."
2. Section B, Item 25, "Refrigeration."
3. Section B, Item 27, "Records."

APPENDIX A

INSPECTION OF CERTIFIED SHELLFISH SHIPPERS

GENERAL: Section A-2 of Part I specifies that shellfish shippers certified by States under the Cooperative Program shall meet the construction requirements of Part II of this manual prior to certification, and shall maintain satisfactory sanitary conditions during periods of operation. Establishments not meeting these two requirements will not be eligible for inclusion on the Public Health Service list of State certified shellfish shippers.

Plants will be considered as meeting the basic sanitary standards of Part II of this manual when the two following conditions are met: (1) the same sanitation item is not violated repeatedly, and (2) a sanitation rating of at least 80 percent, as determined by a standardized inspection procedure, is achieved.

Sanitation rating of shucker-packer and repacker establishments should be determined by use of an inspection report equivalent to PHS-769, a copy of which is included as page 28 of this manual. The percentage values assigned to each item are shown on the sample inspection report. Percent values are not shown for items B-1, B-19, C-1, C-2, D-1, D-2, and D-3 since any violations of these items are applied against the tentative percentage rating for the plant. Percentage values for these items are given in table IV. Section C of the inspection report (PHS-769) should not be used unless the shucker-packer ships a portion of his product in the shell. Section D of the inspection report (PHS-769) should not be used unless the shucker-packer also repacks shellfish.

Sanitation ratings for shell-stock shippers should be determined by use of an inspection report equivalent to the "Shell-Stock Shipper Inspection Report," a copy of which is included as page 29 of this manual. The percentage values assigned to each item are shown on the sample inspection report.

Sanitation Rating for Shucker-Packers: In computing a sanitation rating for a shucker-packer the violations recorded under Section B on the inspection report should be totaled using the indicated percentage values. This total, when subtracted from 100, will give a tentative percentage sanitation rating. If items B-1 or B-19 are violated an additional 25 percent or 50 percent should be subtracted from the tentative rating (see table IV). Similarly any violations recorded under sections C and D should also be subtracted according to the table IV schedule.

TABLE IV

Percentage Values for Use in Establishing Sanitation Ratings of Shucker-Packers by Use of Standardized Inspection Report, PHS-769

Section	Item number	Item	Percent values
B	1	Wet Storage	25
	19	Source of Shellfish	25

TABLE IV
(Continued)

Section	Item number	Item	Percent values
C	1	Shell-Stock Washing	1
	2	Shell-Stock Shipping Container	2
D	1	Shellfish for Repacking	2
	2	Refrigeration	4
		Frozen Shellfish	1
	3	Returnable Containers, Cleaned	1

Sanitation Ratings for Repackers: The instructions for rating a shucker-packer should be followed in rating a repacker except that section B items not applicable to the operation of the repacker should be indicated on the inspection report and should be taken into consideration in computing the tentative sanitation rating according to the following formula:

$$\text{Tentative sanitation rating (percent)} = \frac{(\text{Percent compliance section B})(100)}{(\text{Percentage of section B applicable})}$$

Any violations noted for items B-1, B-19, C-1, C-2, D-1, D-2, or D-3, should be subtracted from the tentative rating according to the table IV schedule to obtain a final rating.

Sanitation Ratings for Shell-Stock Shippers:

The required physical facilities and operating procedures for shell-stock shippers varies with the type of establishment. Therefore, all items on the inspection report will not apply to every shipper. (See section C, Part II, this manual.) In completing the inspection report those items which are not applicable to the particular shipper should be so indicated. These "not applicable" items should be taken into consideration in computing the sanitation rating for the shipper according to the following formula:

$$\text{Sanitation rating (percent)} = \frac{\text{(Percent compliance) (100)}}{\text{(Percent applicable)}}$$

PHS-769-1
Rev. 5-65

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE

Form Approved:
Budget Bureau No. 68-R633

SHUCKING-PACKING PLANT INSPECTION REPORT

PLANT NAME AND LOCATION

CERTIFICATE NO.

PRODUCT

NUMBER OF SHUCKERS

SECTION B (Shucking-Packing)	
1. WET STORAGE:	
Protected; State approved	*
2. PLANT ARRANGEMENT:	
Not subject to flooding	1.0
Separate shucking and packing rooms	1.0
Proper delivery window	0.5
Adequate packing & clothing rooms	1.0
3. DRY STORAGE OF SHELL STOCK:	
Floors, impervious, graded to drain	2.0
Walls, smooth, well-constructed	0.5
Conveyances easily-cleanable; clean	0.5
Not used as passageway	0.5
Floor drain protected against backflow	0.5
4. FLOORS:	
Impervious; smooth; graded to drain	1.0
5. WALLS AND CEILINGS:	
Smooth; washable; light-colored	2.0
6. FLY CONTROL MEASURES:	
Adequate screens or fans; self-closing, outward-opening screen doors	1.5
Approved internal fly-control measures	1.0
Free from flies	1.0
7. LIGHTING:	
Ample; properly distributed	2.0
8. HEATING AND VENTILATION:	
Comfortable temperature; well ventilated	0.5
9. WATER SUPPLY	
Safe; adequate quantity	15.0
Outlet in each room	0.5
Ample; regulated, hot water supply	2.0
Hot & cold water at each sink vat	0.5
10. PLUMBING AND RELATED FACILITIES:	
Approved, no cross-connections	6.0
Adequate number and location of lavatories; hot and cold water; mixing valves; soap; single-service towels	2.0
Handwashing signs posted	0.5
Adequate number and location of toilets; clean; good repair; ventilated; lighted; supply of toilet tissue	2.0
Toilet room doors, self-closing, tight	1.0
No overhead drains	0.5
11. SEWAGE DISPOSAL: Satisfactory	1.0
12. RODENT CONTROL:	
Rodent free; proper construction	1.5
Safe use and storage of rodenticides	1.0

13. CONSTRUCTION OF BENCHES:	
Smooth; impervious; self-draining	2.0
Blocks easily cleanable; non-toxic	0.5
Stalls & stools cleanable; painted	0.5
No attached padding on stools	0.5
14. EQUIPMENT CONSTRUCTION:	
Material; smooth surfaces & joints; good repair; easily cleanable; equipment installed complies sub-item j	2.5
Container rims 2′ above floor	0.5
Blower not connected directly to sewer	0.5
Blower air intake protected	0.5
15. GENERAL CLEANLINESS:	
No miscellaneous equipment or material	1.0
Plant used only for shellfish	0.5
No animals, fowl, unauthorized persons	1.0
Premises clean; no rubbish	0.5
Shuckers do not go into packing room	0.5
16. CLEANING:	
Building & equipment cleaned within 2 hrs.	2.0
Benches and blocks disinfected weekly	0.5
Sinks, bactericides, detergents, and brushes	0.5
Blowers and tanks rinsed between uses	0.5
Refrigerators clean	0.5
17. BACTERICIDAL TREATMENT OF EQUIPMENT: Approved	2.0
18. STORAGE OF EQUIPMENT:	
Treated equipment properly stored	1.5
19. SOURCE OF SHELLFISH:	
Approved	*
20. SHELL STOCK COOLING:	
Refrigerated or protected as necessary	1.0
21. SHUCKING SHELLFISH:	
Wash water from approved source (See item 9)	
Shell stock free of mud	1.0
Bluff not returned	2.0
Dip buckets not used	0.5
Shucking containers rinsed after each use	0.5
22. SHELL DISPOSAL: Prompt	0.5
23. SINGLE-SERVICE CONTAINERS:	
Store rooms clean, no rodents, trash, insects	1.5
Kept clean and dry until used	1.5
Contaminated containers sanitized or discarded	1.0

24. PACKING SHUCKED SHELLFISH:	
Shellfish not contaminated during packing	1.0
Containers closed as soon as feasible	1.0
Clean, properly-designed containers	0.5
Containers: identified, Code-dated	1.0
25. COOLING SHUCKED SHELLFISH:	
Cooled to 45° in 5 hrs	2.5
Stored at 45° or less	2.5
Frozen and stored at 0° or less	0.5
26. ICE:	
From approved source; protected from contamination; washed	1.5
27. RECORDS: Complete, accurate	1.5
28. PERSONNEL HEALTH:	
Infected persons and carriers excluded	1.5
29. SUPERVISION: Effective	3.0
30. CLEANLINESS OF EMPLOYEES:	
Clean aprons or coats; properly stored	1.0
Finger cots sanitized; no tobacco used	0.5
Packing-room workers wear rubber gloves or wash and disinfect hands	2.0
Handwashing by employees	2.0
SECTION C (SHELL STOCK)	
1. WASHING SHELL STOCK:	
Shell stock clean at time of shipment	*
Wash water from approved source (See item 9)	
2. SHIPPING SHELL STOCK:	
Shipping containers clean, identified	*
SECTION D (REPACKING)	
1. SHELLFISH FOR REPACKING:	
In approved containers at 45° or less	*
2. REFRIGERATION DURING REPACKING:	
Temperature does not exceed 45°	*
Frozen shellfish not thawed	*
3. CLEANING OF RETURNABLE CONTAINERS:	
Cleaned soon after emptying	*

REMARKS

DATE

SANITARIAN

*These items not included in computation of initial sanitation rating for Shucker-Packers.

☆ U.S. GOVERNMENT PRINTING OFFICE : 1965 OF—776-723

PHS-769-3
Rev. 5-65

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE

Form Approved:
Budget Bureau No. 68-R633

SHELL STOCK SHIPPER OR RESHIPPER INSPECTION REPORT

PLANT NAME AND LOCATION	CERTIFICATE NO.
	PRODUCT
	NUMBER OF EMPLOYEES

Items not applicable to shipper being inspected should be indicated in appropriate block as "NA"

SECTION A	▨	NA
1. BOATS AND TRUCKS:	▨	▨
Construction satisfactory	1	
Kept clean, containers clean	1	
Cleaned after relaying operations	1	
3. BODY WASTE DISPOSALS:	▨	▨
Not discharged in harvesting area	1	
Soil cans—used for purpose intended, secured, proper disposal	1	
SECTION B	▨	▨
1. WET STORAGE:	▨	▨
Protected; State Approved	20	
3. SHELL STOCK STORAGE:	▨	▨
Floors, impervious, graded to drain	2	
Walls, smooth, well-constructed	1	
Conveyances easily-cleanable; clean	1	
Not used as a passageway	1	
Floor drain protected against backflow	1	
9. WATER SUPPLY:	▨	▨
Safe; adequate quantity	15	
10. PLUMBING AND RELATED FACILITIES:	▨	▨
Approved; no cross-connections	3	
Lavatories; soap; single-service towels	2	
Handwashing signs posted	1	
Toilet rooms clean; good repair; ventilated; lighted; supply of toilet tissue	2	
Toilet room doors self-closing, tight	1	
No overhead drains	3	
11. SEWAGE DISPOSAL:	▨	▨
Satisfactory	2	
12. RODENT CONTROL:	▨	▨
Rodent free; proper construction	2	
Safe use and storage of rodenticides	1	
15. GENERAL CLEANLINESS:	▨	▨
No miscellaneous equipment or material	2	
No animals, fowls, unauthorized persons	1	

15. GENERAL CLEANLINESS (Cont'd):	▨	NA
Premises clean; no rubbish	1	
19. SOURCE OF SHELLFISH:	▨	▨
Approved	20	
20. SHELL STOCK COOLING:	▨	▨
Refrigerated or protected as necessary	2	
25. REFRIGERATION OF SHUCKED SHELLFISH:	▨	▨
Internal temperature of stored shellfish 45° or less	1	
Frozen shellfish storage 0° or less	1	
27. RECORDS: COMPLETE, ACCURATE	3	
28. PERSONNEL HEALTH:	▨	▨
Infected persons and carriers excluded	3	
SECTION C	▨	▨
1. WASHING SHELL STOCK:	▨	▨
Shell stock clean at time of shipment	1	
Washwater from approved sources (See item 9)	▨	▨
2. PACKING AND SHIPPING SHELL STOCK:	▨	▨
Shipping containers clean	1	
Shipments properly identified	1	
SECTION E: (Applies only to reshippers)	▨	▨
1. SOURCE, (Sec. B, Item 19)	25	
2. REFRIGERATION, (Sec. B, Item 25):	▨	▨
Internal temperature 45° or less	25	
Frozen shellfish 0° or less	25	
3. RECORDS, (Sec. B, Item 27)	25	

REMARKS

DATE	SANITARIAN

(Sections and item numbers refer to PHS Publication 33, Part II, Rev. 1965)

U.S. GOVERNMENT PRINTING OFFICE : 1965 OF—776-724

APPENDIX B

RECOMMENDED CODE-DATING SYSTEM FOR SHUCKER-PACKERS AND REPACKERS

The following code-dating system is recommended to the States in establishing their code-dating system for shucker-packers and repackers as required by item 24:

A five digit number and letter system should be established which will reflect the year, the month, the day of the month, and the morning or afternoon in which the shellfish were packed or repacked. Larger packers may wish to indicate morning or afternoon packing by using the letter "A" or "P" in their code system.

Example: 31012

3-1963

10-10th month, October

12-day of month

Example: 40510

4-1964

5-5th month, May

10-day of month

It is further recommended the repackers be required to precede their code-dating digits with the letter "R" to indicate the product is repacked.

Appendix B

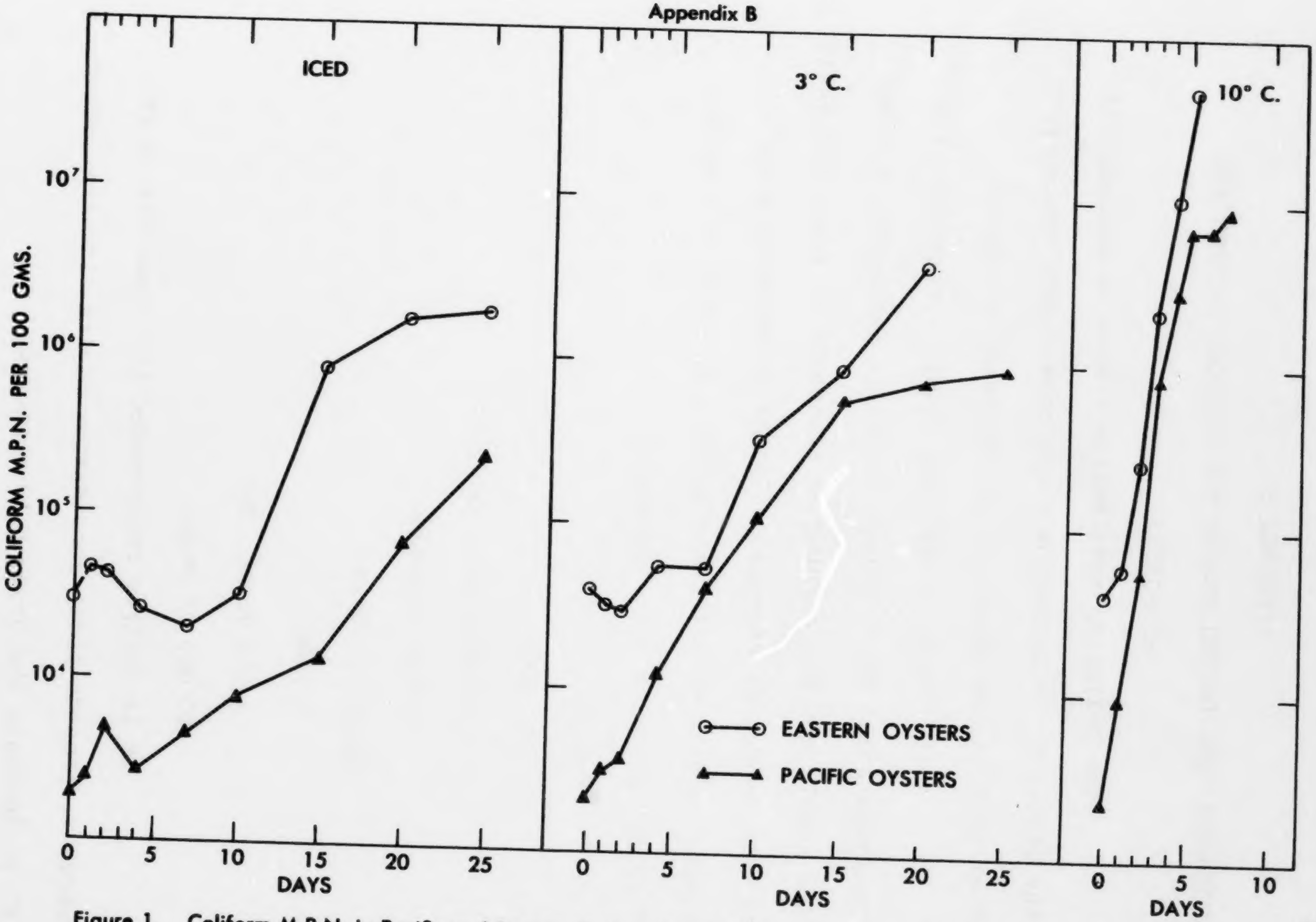


Figure 1. Coliform M.P.N. in Pacific and Eastern Oysters stored in ice and at 3° C. (37.5° F.) and 10° C. (50° F.).

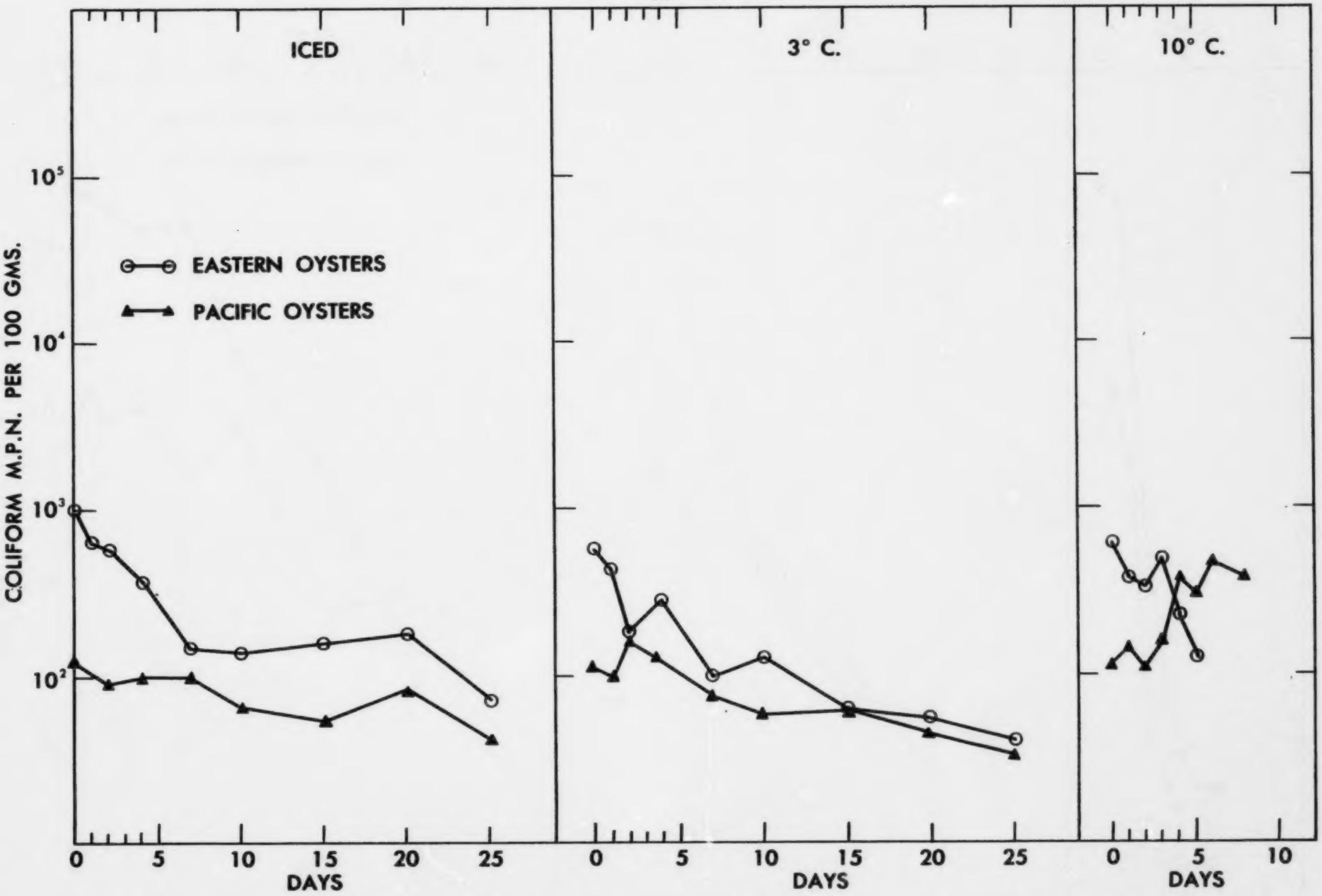


Figure 2. Fecal coliform M.P.N. in Pacific and Eastern oysters stored in ice and at 3° C. (37.5° F.) and 10° C. (50° F.).

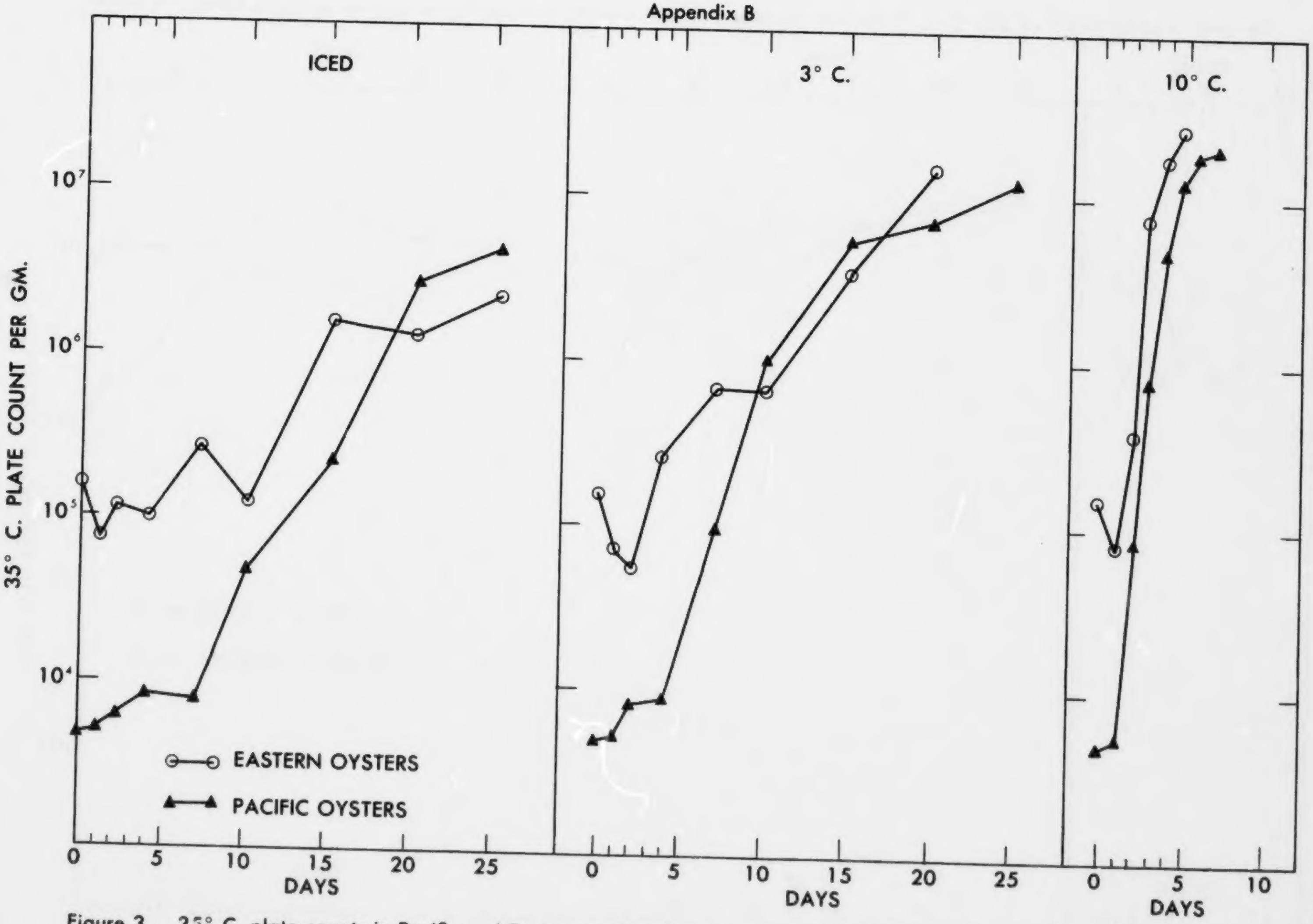


Figure 3. 35° C. plate counts in Pacific and Eastern oysters stored in ice and at 3° C. (37.5° F.) and 10° C. (50° F.).

Appendix B

Name of firm: John Doe
Address: 12 Spring Road, Benton, Florida
State certification No.: 10

Shucker-Packer Ledger Report

Quantity purchased or harvested (indicate oysters, clams, or mussels)	Date of harvest	Date of purchase	State area designation from which harvested	Name and address, or State permit or license number of harvester	Quantity sold (indicate oysters, clams, or mussels)	Date sold	State permit or license number, or name and address of purchaser
(Example of use of form by shucker-packers)							
40 bushels oysters	1/12/66	(*)	WL—Wash	Wash.—28	40 gallons oysters	1/12/66	Redwood Foods Inc., Tacoma, Wash.
20 bushels oysters	1/14/66	1/15/66	GH—Wash	Wash.—7	30 gallons oysters	1/15/66	Sea Food Corp., Olympia, Wash.
10 bushels oysters	1/14/66	1/15/66	N—Oreg	John Jones 12 Shady Lane, Portland, Oreg. Oreg.—12	31 pints oysters	1/15/66	Cash sales to individual buyers through salesroom.
					12 gallons oysters	1/16/66	Toms Grocery, 120 Sentinel Highway, Aberdeen, Wash.

---

*Date of purchase not applicable since shucker-packer dredged these oysters from his own leased ground.

Appendix B

Name of firm: John Doe
Address: 12 Spring Road, Benton, Florida
State certification No.: Fla.—12
State permit or license No.: 1267

Shell-Stock Shipper Ledger Report

Quantity purchased or harvested (indicate oysters, clams, or mussels)	Date of harvest	Date of purchase	State area designation from which harvested	Name and address, or State permit or license number of harvester	Quantity sold indicate oysters, clams, or mussels)	Date sold	State permit or license number, or name and address of purchaser
(*Example of use of form by shell-stock shippers (includes "Buy" boats and "Buy" trucks)*)							
20 bushels clams	1/2/66	1/3/66	NA—Fla	Fla.—162	5 bushels clams	1/4/66	Fla.—34.
10 bushels oysters	1/3/66	(*)	AB—Fla	Fla.—12	5 bushels clams	1/5/66	Shipped to Wholesale Inc., 40 Maine Ave., Washington, D.C.
5 bushels clams	1/4/66	1/5/66	DF—Fla	John Jones 24 Reo Place Benton, Florida	½ bushel clams	1/5/66	Jane Doe, 7 Maryland Rd., Benton, Fla.
					10 bushels clams	1/6/66	Delmar Restaurant, 101 Riverside Dr., Miami, Fla.
					4 bushels clams	1/6/66	Shipped to Kraften Foods, Inc., 106 Trane Ave., Atlanta, Ga.
					8 bushels oysters	1/6/66	Shipped to Groceries, Inc., 124 Bourbon St., New Orleans, La.
					4½ bushels clams	1/9/66	Destroyed.
					2 bushels oysters	1/10/66	Destroyed.

*Date of purchase not applicable since oysters were tonged by shell-stock dealer Fla.—12 himself from leased ground.

APPENDIX B

COOLING RATES OF FRESH OYSTERS

Central Laboratory Report*

OBJECT

At the request of the USPHS the rate of cooling fresh oysters was determined on various size cans in crushed ice and under dry refrigeration.

CONCLUSIONS

The attached graphs contain the cooling rate curves for 1 gallon (610 x 708), 1/2 gallon (610 x 314), 1 pint (307 x 314), 12 fl. oz. (307 x 300), and 1/2 pint (307 x 202) cans cooled in crushed ice and cooled in a dry refrigerated chest. As expected, the cooling rate in crushed ice was faster than in dry refrigeration. Following the initial lag period, the cooling rates were generally the same regardless of initial temperatures.

PROCEDURE

Fresh standard grade oysters were heated in a steam-jacketed kettle to the desired initial temperature and filled into the cans for the first run at each refrigeration condition. In subsequent runs the oysters were warmed in a water or air bath to the desired initial temperature.

---

*Prepared by the American Can Company, Technical Service Division at the request of the U.S. Public Health Service.

The temperatures in the cans were taken with heat penetration thermocouples connected to a potentiometer. The junction of the thermocouple was located at the geometric center of the can.

The first cooling rate determination was made with the cans packed in crushed ice. The cans were covered with ice at all times and a drain carried away the water as the ice thawed. The ice temperature was 31°-32°F.

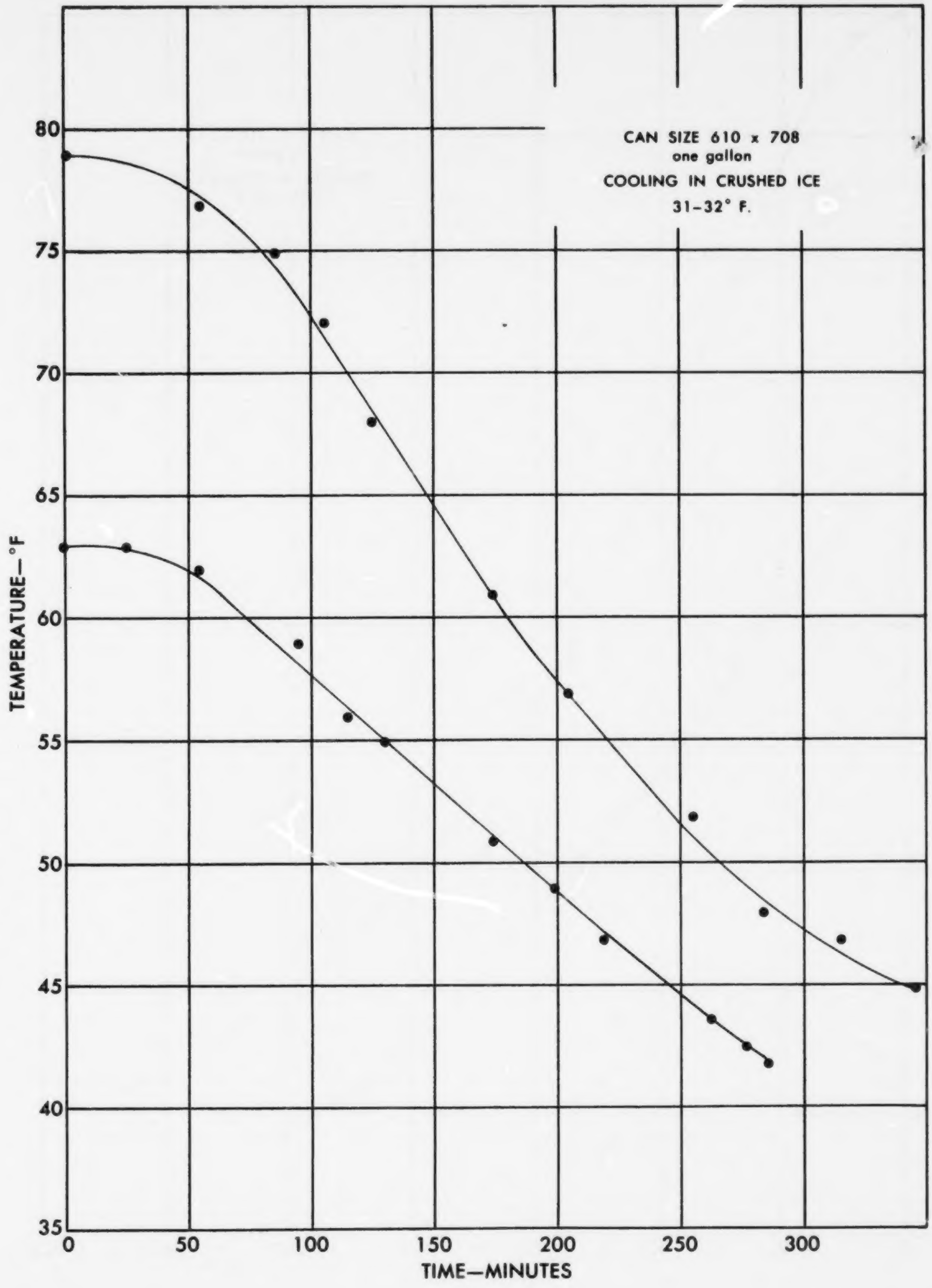
The second determination was made in a refrigerated chest at a temperature of 31°-32°F. A small fan in the chest kept the air gently circulating.

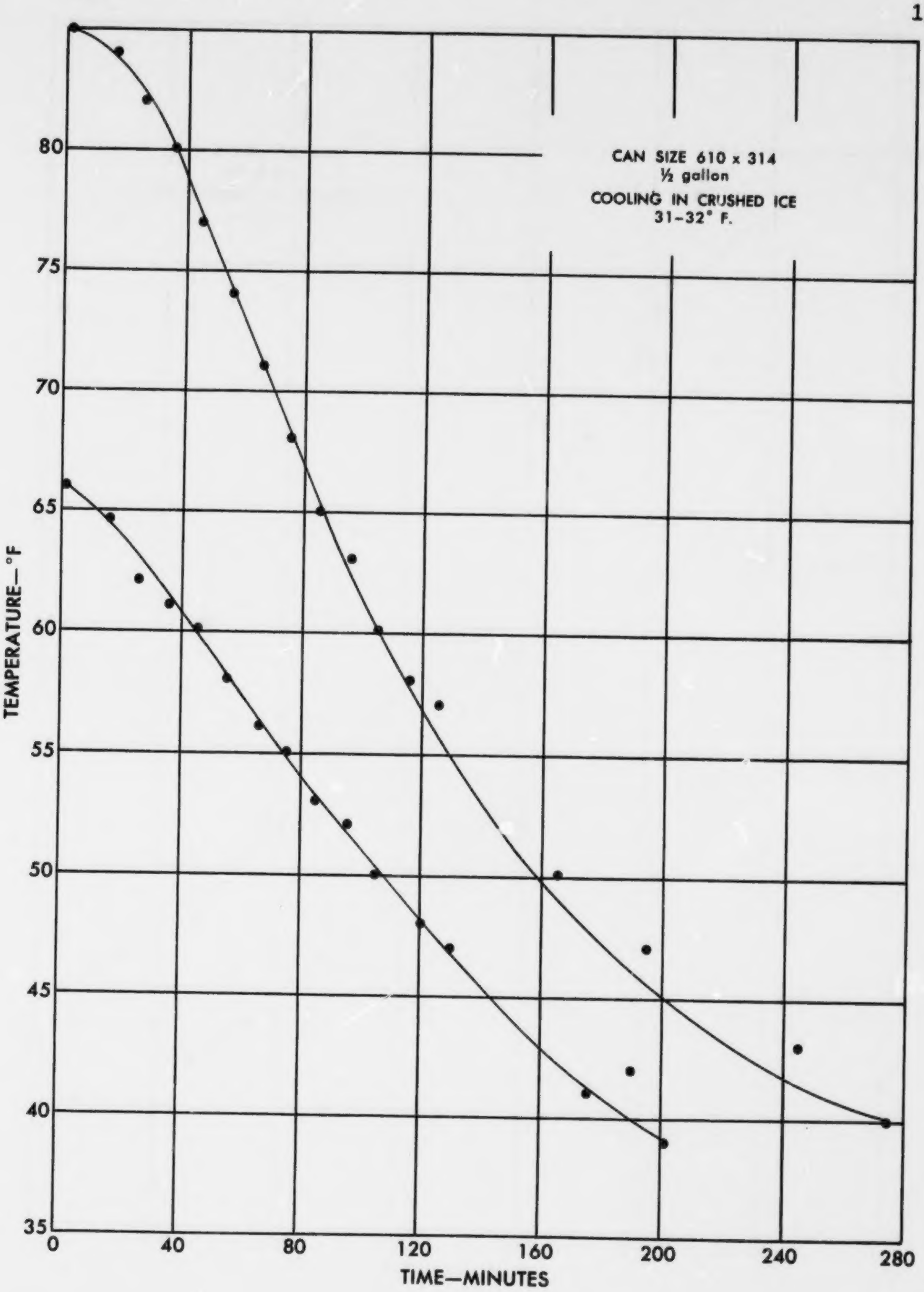
Fresh oysters were used for each refrigeration condition and no deterioration other than some sloughing from physical agitation was noted.

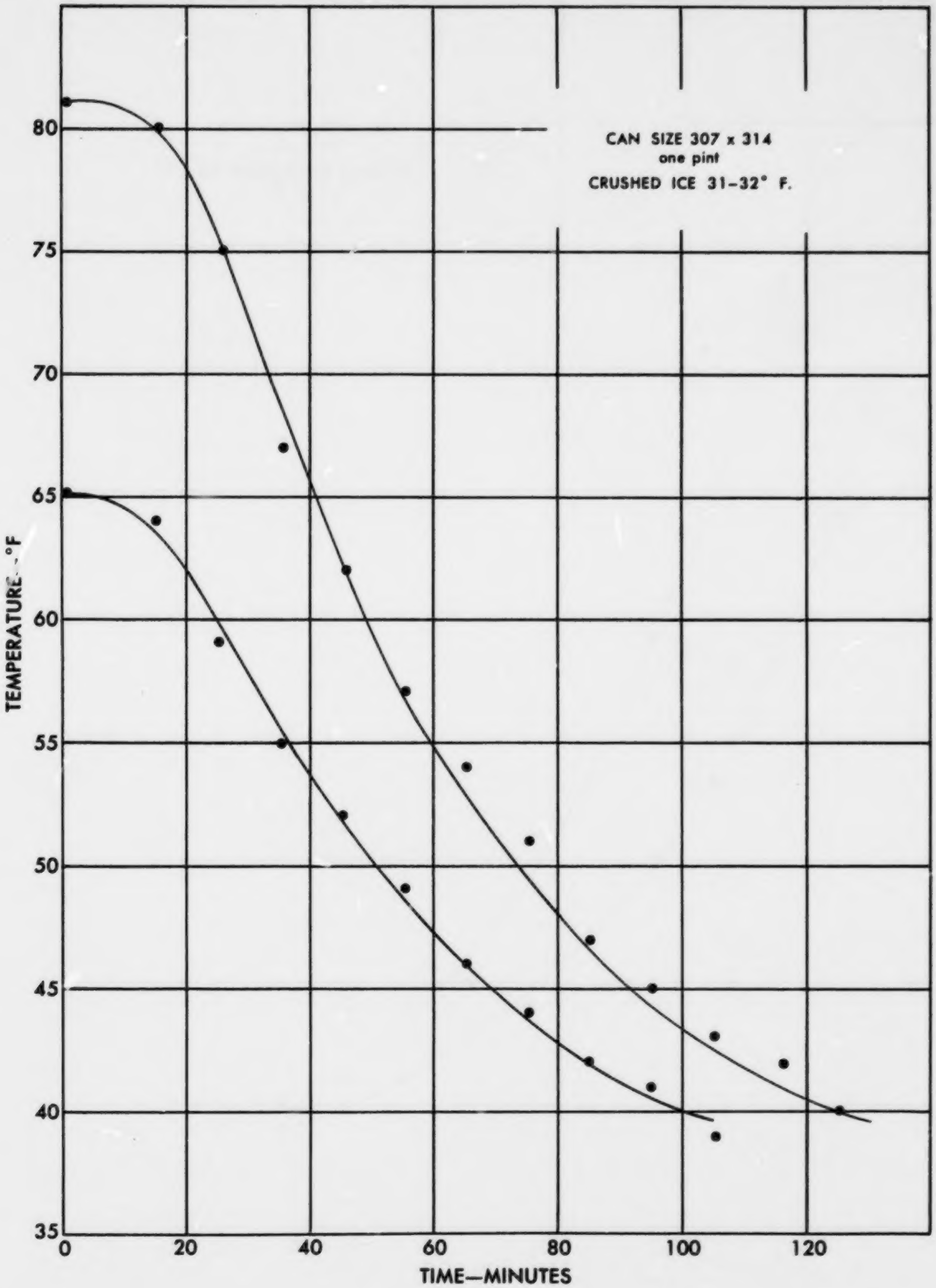
DISCUSSION

The original request was for cooling rates at initial temperatures of 50°F. increments. We believe that from the attached curves which represent maximum and minimum initial temperatures, the time to cool to any given temperature from any given initial temperature can be interpolated very closely.

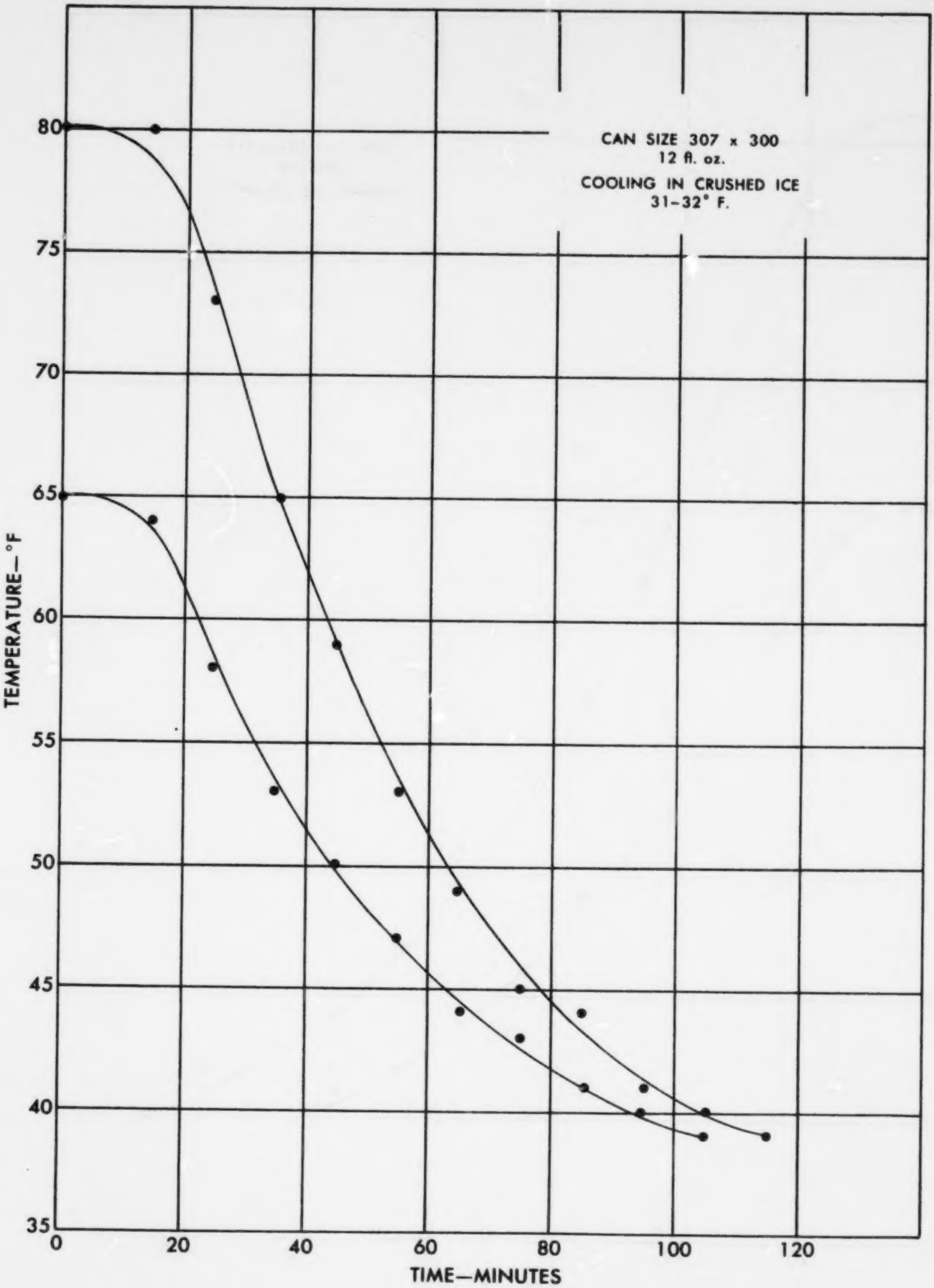
D. B. MORDEN,
Meat, Fish, and Dairy Group.

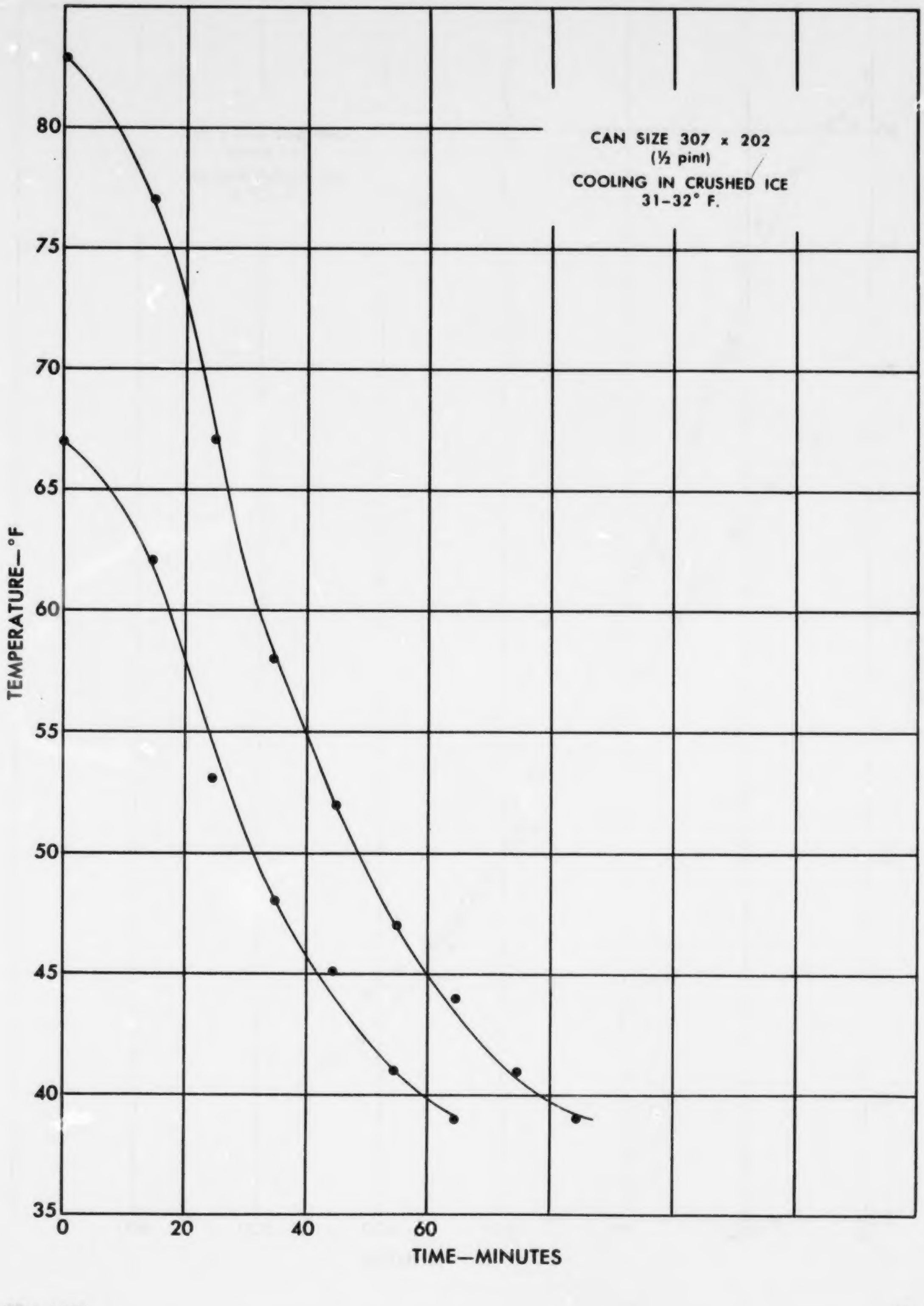

CAN SIZE 610 x 708
one gallon
COOLING IN CRUSHED ICE
31–32° F.
TEMPERATURE—°F
TIME—MINUTES
80
75
70
65
60
55
50
45
40
35
0
50
100
150
200
250
300

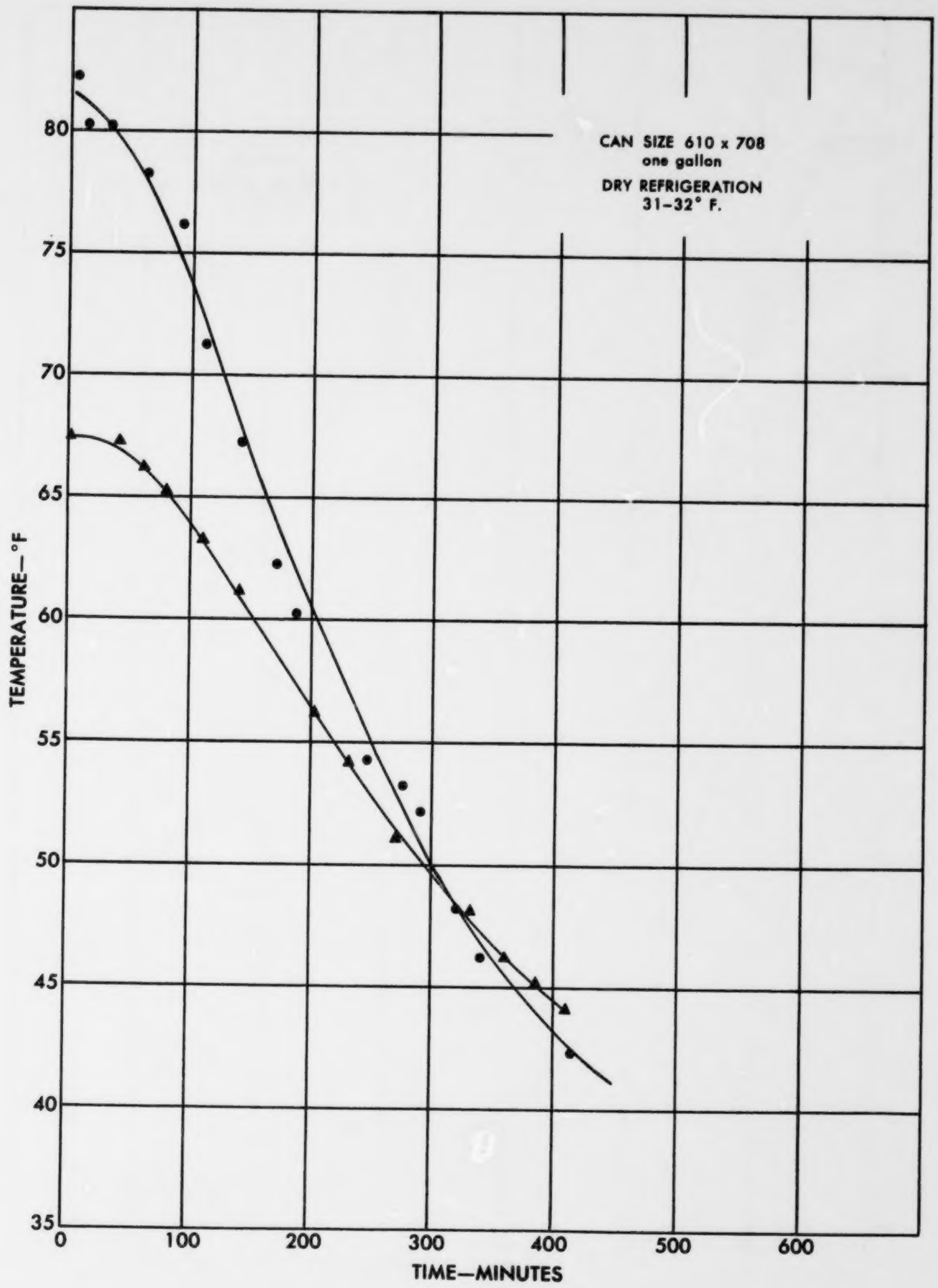

CAN SIZE 610 x 314
½ gallon
COOLING IN CRUSHED ICE
31–32° F.
TEMPERATURE—°F
TIME—MINUTES
35
40
45
50
55
60
65
70
75
80
0
40
80
120
160
200
240
280

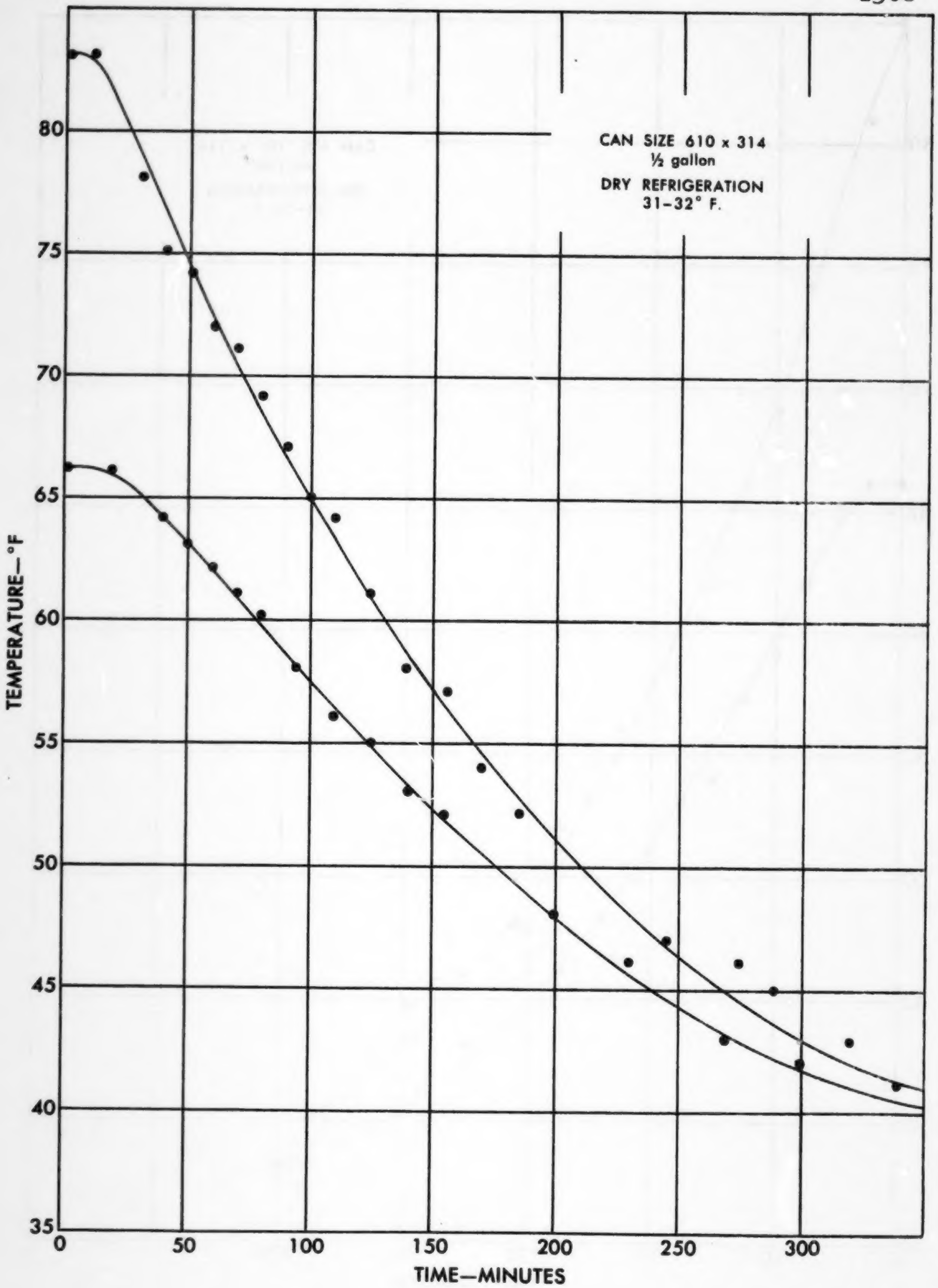

CAN SIZE 307 x 314
one pint
CRUSHED ICE 31-32° F.
TEMPERATURE - °F
80
75
70
65
60
55
50
45
40
35
0
20
40
60
80
100
120
TIME—MINUTES

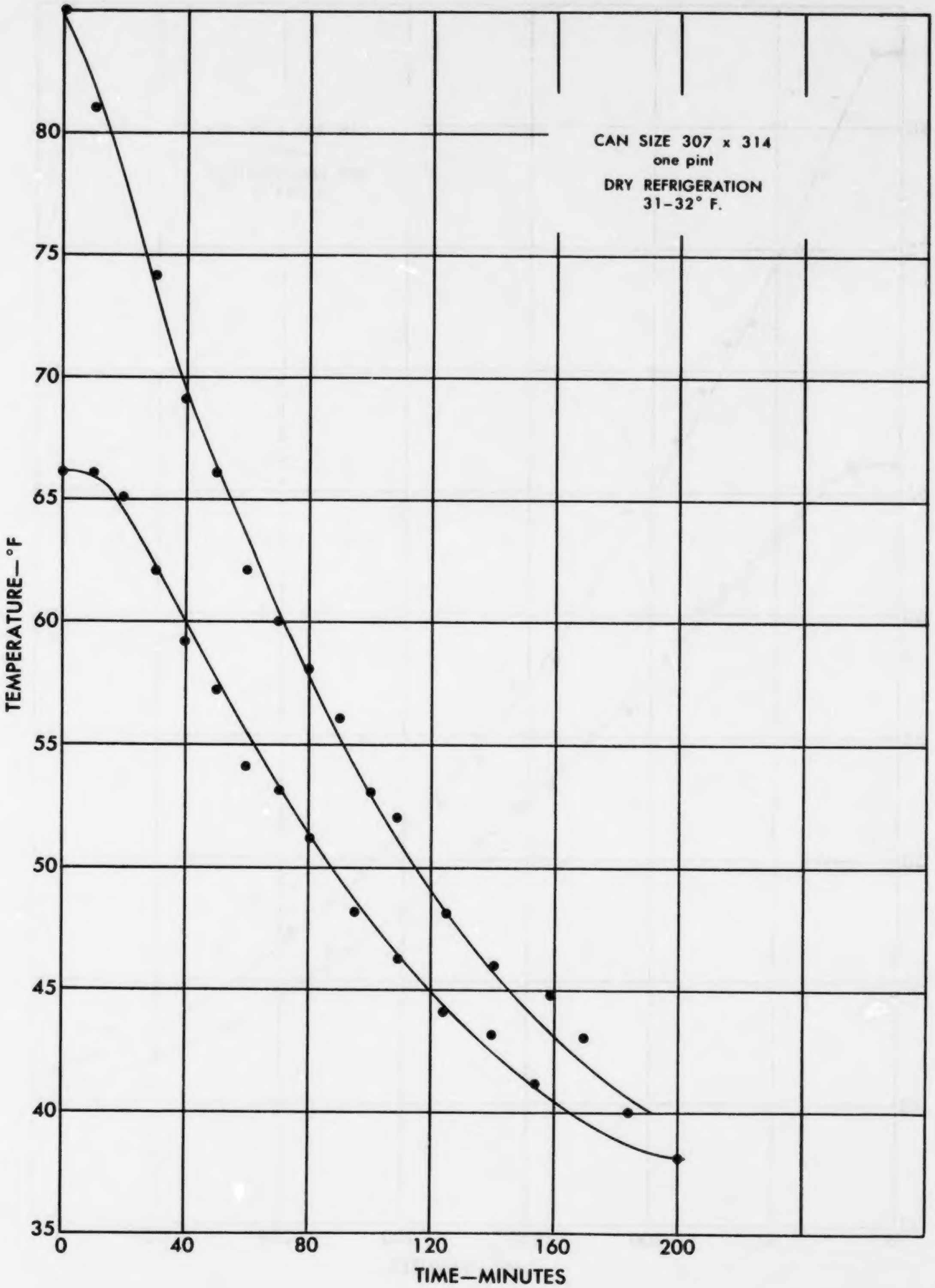
776-722 O - 65 - 4

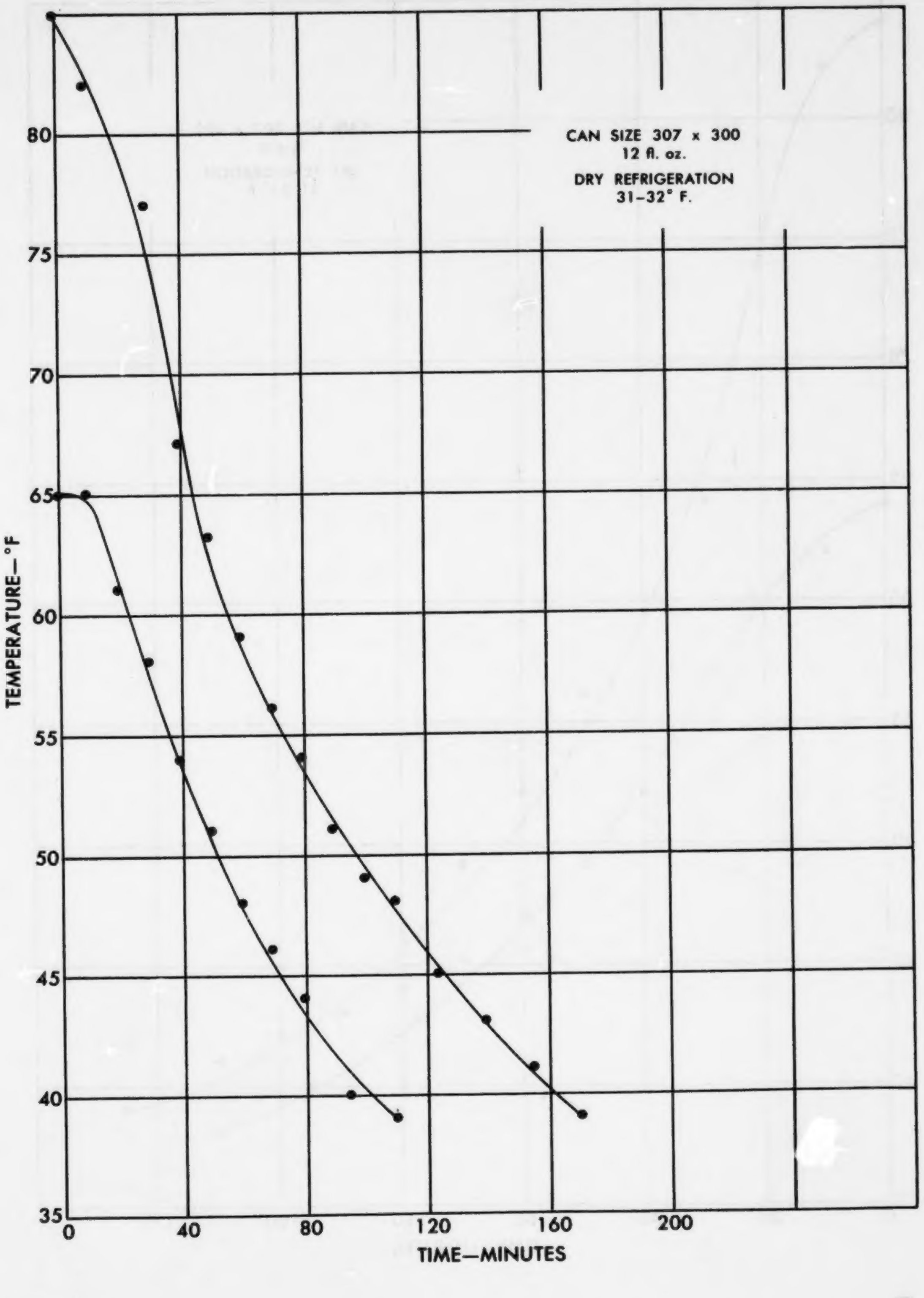

CAN SIZE 307 x 300
12 fl. oz.
COOLING IN CRUSHED ICE
31-32° F.
TEMPERATURE—°F
TIME—MINUTES
35
40
45
50
55
60
65
70
75
80
0
20
40
60
80
100
120


CAN SIZE 307 x 202
(½ pint)
COOLING IN CRUSHED ICE
31-32° F.
TEMPERATURE—°F
80
75
70
65
60
55
50
45
40
35
0
20
40
60
TIME—MINUTES

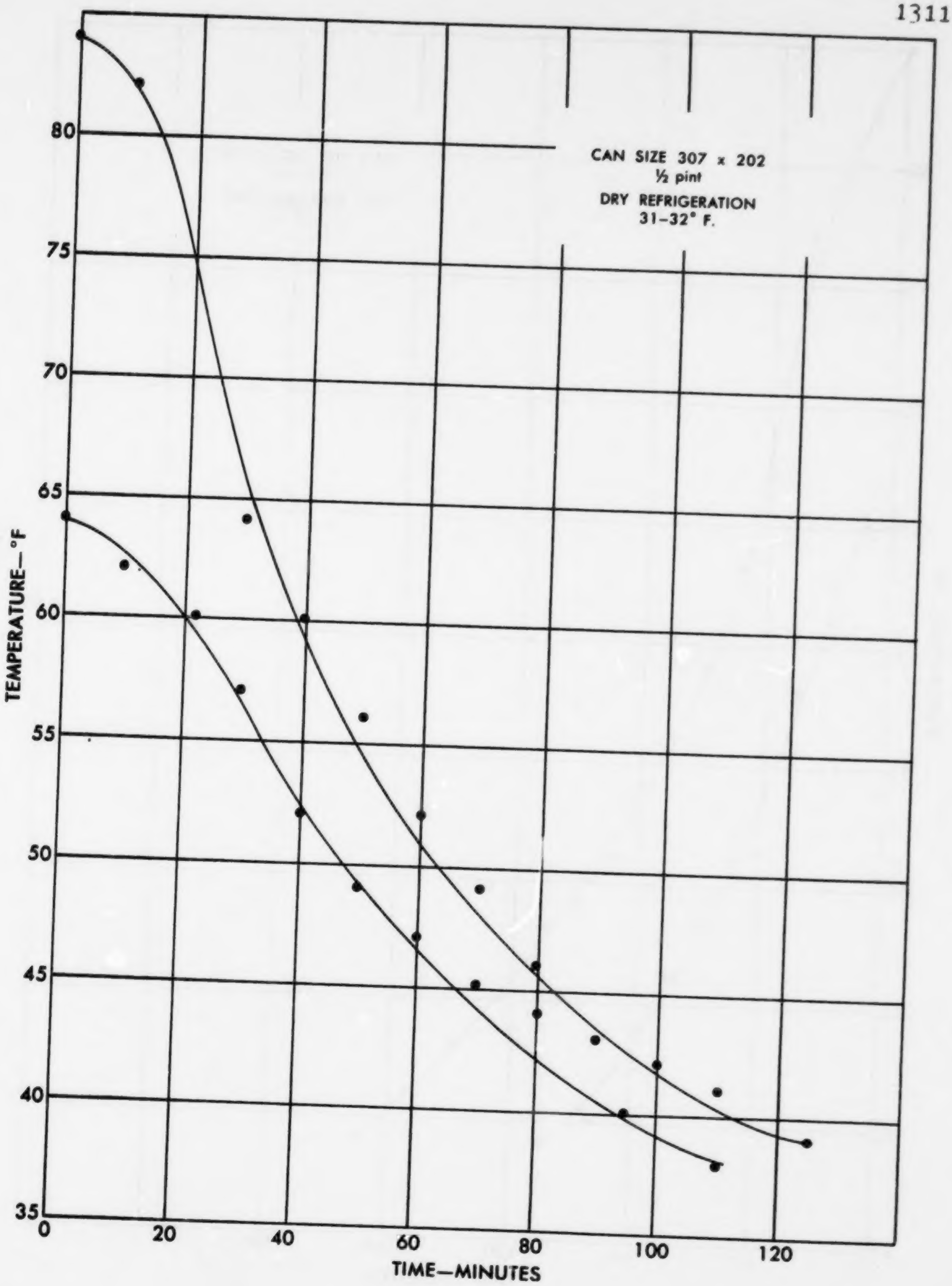

CAN SIZE 610 x 708
one gallon
DRY REFRIGERATION
31–32° F.
TEMPERATURE—°F
80
75
70
65
60
55
50
45
40
35
0
100
200
300
400
500
600
TIME—MINUTES


CAN SIZE 610 x 314
½ gallon
DRY REFRIGERATION
31-32° F.
TEMPERATURE—°F
80
75
70
65
60
55
50
45
40
35
0
50
100
150
200
250
300
TIME—MINUTES


CAN SIZE 307 x 314
one pint
DRY REFRIGERATION
31-32° F.
TEMPERATURE—°F
TIME—MINUTES
35
40
45
50
55
60
65
70
75
80
0
40
80
120
160
200


CAN SIZE 307 x 300
12 fl. oz.
DRY REFRIGERATION
31-32° F.
TEMPERATURE—°F
80
75
70
65
60
55
50
45
40
35
0
40
80
120
160
200
TIME—MINUTES

1311


CAN SIZE 307 x 202
½ pint
DRY REFRIGERATION
31–32° F.
TEMPERATURE—°F
80
75
70
65
60
55
50
45
40
35
TIME—MINUTES
0
20
40
60
80
100
120

APPENDIX C

HEAT SHOCK METHOD OF PREPARATION OF OYSTERS FOR SHUCKING

The Eastern oyster Crassostrea virginica in some areas is found in clusters which prevents rapid or conventional shucking as with the same species in other oyster growing areas. This natural phenomena has presented questions as to how best this natural resource might be utilized as a food source and remain within economic possibilities.

Dr. A. D. Tennant[1] in Canada investigated the short-term dipping of soft shell clams in near boiling water for various periods of 3 to 30 seconds. It was reported that this short-term heat shock resulted in a reduction of coliform and fecal streptococci numbers. The reduction obtained after 3 to 10 seconds' immersion was not significantly less than that recorded after longer periods of heat treatment with the animals still alive after the immersion. There was no significant increase in the MPN values in "shocked" clam meats during 7-day refrigeration periods, and the short period of immersion did not impair the keeping qualities of the packed, refrigerated clam meats. The "shocking" process also reduced the amount of surface contamination carried to the shucking tables by the shell-stock and facilitated shucking without affecting the palatability of the product.

It has further been found that immersing the cluster-type oyster in comparatively hot water (145°-150°F.) for a short period of time (up to 3-1/2 minutes) facilitates the removal of oyster meat up to 99 percent of that contained in the cluster. This process has been investigated under a cooperative project by the Public Health Service and the South Carolina State Board of Health.[2] The "heat shock" process resulted in an overall reduction in the coliform and fecal coliform MPN's at all percentile levels. The greatest reduction occurred in the samples examined immediately after shocking. Holding on the shucking bench appears to result in a slight increase in these two groups of bacterial indices as compared to oysters examined immediately after shocking; however, these levels remain significantly lower than the levels obtained on samples from the cold shucking process. Accordingly, it has been concluded that with application of sanitary precautions the beneficial use of this food source may be fully realized.

The following sanitary measures are delineated for use where the "heat shock" method of preparation of oysters for shucking is permitted by State shellfish sanitation authorities. These are intended to apply only to the cluster-type oyster, but may be adaptable to other species in other areas.

1. WASHING OF SHELL-STOCK. -- Shell-stock sub-

jected to the heat shock process shall be washed immediately prior to the heat shock operation in potable water. Experience has shown that wash water temperatures between 65°F. and 75°F. are effective for adequately washing shell-stock. Shell-stock shall be protected from contamination prior to and during the prewash cycle.

Public-health explanation. -- Although Item 2 of section A requires that shell-stock be washed reasonably free of bottom sediments and detritus as soon after harvesting as is practicable, it is necessary to again wash shell-stock immediately prior to heat shocking to reduce the bacterial load in the dipping tank. Invariably some mud or detritus will adhere to the shell-stock; hence, the necessity to again wash the shell-stock before it is immersed in the heat shock water where the mud or detritus may be released by the warmer water. The cleaner the shell-stock, the more rapidly the oysters will arrive at the optimum temperature for shucking and there will be less variation in heat transfer among different lots.

Satisfactory compliance. -- This item will be satisfied when --

a. All shell-stock subjected to the heat shock process are washed immediately prior to the heat shock operation in flowing potable water. Water temperatures not less than 65°F. nor more than 75°F. are recommended.

b. Shell-stock are handled in a manner which prevents their contamination during the prewash cycle.

2. TEMPERATURE AND CHANGE OF DIP WATER. -- During the heat shock process the water shall be maintained at not less than 145°F. or more than 150°F. The water shall be completely drained or removed from the heat shock tank at least once each 3-hour period. An accurate[4] indicating or recording thermometer shall be available and used during the heat shock process for temperature measurements. Recording thermometers are recommended so as to provide a record of the temperatures used.

Public-health explanation. -- Experience and research indicates the temperature range of 145°-150°F. to be adequate to facilitate removal of oysters from the shell without apparent physical change to the oyster. A temperature range is specified rather than an exact temperature because of varying climatic conditions during the year. Dip water is required to be changed at least every 3 hours to avoid bacterial concentration or build-up of mud or detritus.

Satisfactory compliance. -- This item will be satisfied when --

a. Heat shock water is maintained at not less than 145°F. or more than 150°F.

b. The heat shock watertank is completely flushed at 3-hour intervals or less in such manner that all mud and detritus remaining in the dip tank from previous dippings is eliminated.

c. An indicating or recording thermometer, accurate within 2° between 145°F. and 150°F. is available and is located in the heat shock water during all periods of shock operation.

3. TIME INTERVAL OF IMMERSION. -- Shell-stock subjected to the heat shock process shall not be immersed in the heat shock water for periods longer than 3.0 minutes. An accurate timing device shall be available and used to control the time of immersion. Only approved containers of 1/2-bushel[5] capacity shall be used in the heat shock process. It is recommended that an automatic timer or an automatically electrically controlled timer be used.

Public-health explanation. -- Industry practice and investigation reveals that an immersion time varying between 2 and 3 minutes is all that is necessary to facilitate the shucking process. A maximum time of immersion is specified to prevent any physical change in the oyster which would prevent it from being classified as a fresh product. The maximum time specified is based on the use of 1/2-bushel quantities of shell-stock in 1/2-bushel wire baskets or other 1/2-bushel containers approved by the shellfish sanitation control agency.

Satisfactory compliance. -- This item will be satisfied when --

a. Shell-stock is not subjected to the heat shock process for periods longer than 3 minutes.

b. An accurate timing device is available and used to control the time of immersion.

c. Only approved containers of 1/2-bushel capacity are used during the heat shock process.

4. DIP TANK VOLUME. -- At least 8 gallons of heat shock water shall be maintained in the dip tank for each 1/2-bushel container of shell-stock being heat shocked.

Public-health explanation. -- The minimum of 8 gallons of dip water per 1/2 bushel is necessary to prevent bacterial buildup and extreme variations of temperature in the heat shock water.

Satisfactory compliance. -- This item will be satisfied when there are at least 8 gallons of heat shock water in the heat shock tank for each 1/2-bushel container of shell-stock undergoing the heat shock process.

5. COOLING OF HEAT SHOCKED SHELL-STOCK. -- On removal from the shock immersion water, all heat shocked shell-stock shall be subjected to an immediate cooldown with potable tap water. Heat shocked shell-stock shall be handled in a manner which prevents contamination reaching the shell-stock during the cooling operation.

Public-health explanation. -- After undergoing the heat shock process, the internal temperature of the oyster meat was elevated to temperatures within a range of 98°F. to 110°F. in field studies and 116°-147°F. in laboratory studies. It is therefore necessary to reduce the internal temperatures of the oyster meat immediately to prevent bacterial growth, but not to the extent that the purpose of the process is nullified.

Satisfactory compliance. -- This item will be satisfied when --

a. All heat shocked shell-stock are subjected to cooling with potable tap water immediately upon removal from heat shock process water.

b. All heat shocked shell-stock are handled in such manner as to preclude contamination during the cooling process.

6. REFRIGERATION OF SHOCKED SHUCKED SHELLFISH. -- The oyster meats from all shell-stock which have been subjected to the heat shock process shall be cooled to an internal temperature of 45°F. within 2 hours after the heat shocking process.

Public-health explanation. -- Oyster meat temperatures of shell-stock which have been subjected to the heat shock process are higher than those of conventionally shucked oysters. Therefore, it is necessary that such meats be cooled quickly to 45°F. after the heat shock process to deter bacterial growth.

Satisfactory compliance. -- This item will be satisfied when all oyster meats of shell-stock which have been subjected to the heat shock process are cooled to at least 45°F within 2 hours after the heat shock process and are placed in storage at 45°F. or below. (This requirement will require the use of ice in the shucking containers, blowers, skimming tables, or wash tanks, or the use of refrigerated water, wherein the meats will be in direct c[illegible]tact with crushed or flaked ice, or with refrigerated water.)

7. RECORDS OF HEAT SHOCK TIME AND TEMPERATURES. -- Each plant operating the heat shock process shall maintain an accurate daily record, on a ledger form satisfactory to the State supervisory agency, of the time and temperature of immersion of at least three lots of shellfish during each day of operation as well as recording the time of change of heat shock water. It is preferable that records show the time of day each recorded lot is immersed and the time of day each recorded lot is removed from the water, and that the individual recordings be at intervals of 2 or 3 hours. These records shall be preserved for at least 3 months for the information of the supervising State agency.

Public-health explanation. -- Records are needed to maintain a summary or abbreviated history of each hot dip operation. They are of assistance to the supervisory agency in determining whether the operation is carried out in accordance with these or other State regulations covering the process. They are also of assistance to the operator in maintaining the process within the limitations imposed by State authorities.

Satisfactory compliance. -- This item will be satisfied when --

a. Each operator maintains an accurate daily record of the time and temperature of immersion of at least three lots of shellfish during the day of operation and records the time of change of heat shock water. This record shall be on ledger forms satisfactory to the State supervisory agency. (Plants using recording thermometers will be deemed in compliance with this item if suitable indication is made on the chart when the shell-stock are first immersed and when they are removed from the heat shock water, as well as the time of change of heat shock water.)

b. The above records are preserved and are on file at the plant for inspection by State authorities.

8. CLEANING AND BACTERICIDAL TREATMENT OF HEAT SHOCK PROCESS TANK. -- At the close of each day's operation the heat shock tank shall be completely emptied of all

water, mud, and detritus, and shall be cleaned in accordance with the requirements for cleaning of equipment established by item 16, section B, part II. Prior to the start of the next day's operation, the heat shock tank shall be given bactericidal treatment in accordance with the requirements of item 17, section B, part II. Heat shock process tanks shall be of such construction that they may be easily cleaned.

Public-health explanation. -- If the water, mud, and detritus were allowed to remain in the heat shock tank under declining temperature conditions, it would constitute an excellent medium for growth of bacteria. Emptying the tank and cleaning it at the close of the day's operation will more likely insure that the next day's dipping operation will start under optimum conditions of cleanliness. Bactericidal treatment prior to the start of the next day's operation will insure destruction of any pathogenic bacteria remaining after the cleaning operation or introduced during the interim storage period. It will also prevent carryover of thermophillic or thermoduric bacteria from the previous day's operation.

Satisfactory compliance. -- This item will be satisfied when --

a. The heat shock process tank is thoroughly cleaned at the close of each day's operation in accordance with the requirements for cleaning of equipment established by item 16, section B, part II.

b. The heat shock process tank is flushed with water from an approved source after cleaning and is allowed to drain and dry overnight.

c. Bactericidal treatment complying with the requirements of item 17, section B, part II, is provided the heat shock tank prior to the start of the day's dipping operation.

d. All heat shock process tanks are of such construction that they may be easily cleaned.

* * *

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
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NATIONAL SHELLFISH
SANITATION PROGRAM
MANUAL OF OPERATIONS

Part III

PUBLIC HEALTH SERVICE APPRAISAL OF
STATE
SHELLFISH SANITATION PROGRAMS

1965

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service

NATIONAL SHELLFISH
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U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service

Division of Environmental Engineering and Food Protection
Shellfish Sanitation Branch
Washington, D. C., 20201

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Introduction

Since 1925 the Public Health Service has cooperated with the several States and the shellfish industry in a program designed to insure that shellfish shipped in interstate commerce will be safe to eat. Under this National Shellfish Sanitation Program, each of the participating groups, i.e., the States, the Public Health Service, and the shellfish industry, has accepted certain specified responsibilities. These areas of responsibility are as follows:

1. The States. -- Each shellfish-shipping state adopts adequate laws and regulations for sanitary control of the shellfish industry, makes sanitary and bacteriological surveys of growing areas, delineates and patrols restricted areas, inspects shellfish plants, and conducts such additional inspections, laboratory investigations, and control measures as may be necessary to insure that the shellfish reaching the consumer have been grown, harvested, and processed in a sanitary manner. The state annually issues numbered certificates to shellfish dealers who comply with the agreed-upon sanitary standards, and forwards copies of the interstate certificates to the Public Health Service.

2. The Public Health Service. -- The Public Health

5k Service makes an annual review of each state's control program, including the inspection of a representative number of shellfish-processing plants. On the basis of the information thus obtained, the Public Health Service either endorses or withholds endorsement of the respective state control programs. For the information of health authorities and others concerned, the Public Health Service publishes a semimonthly list of all valid interstate shellfish shipper certificates issued by the shellfish control authorities. In addition, the Public Health Service carries on a shellfish sanitation research program and assists the states in investigation of problems of unusual nature. However, for the purpose of the National Shellfish Sanitation Program, primary emphasis is placed upon the continuing appraisal of state programs to determine that a satisfactory level of sanitation is, in fact, maintained.

3. The Industry. -- The shellfish industry cooperates by obtaining shellfish from safe sources, by providing plants which meet the agreed-upon sanitary standards, by maintaining sanitary plant conditions, by placing the proper certificate number on each package of shellfish, and by keeping and making available to the control authorities records which show the origin and disposition of all shellfish.

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The need for objective procedures to guide the Public Health Service in reviewing each state program, and for specific criteria for PHS endorsement of state programs were discussed at the 1954 and 1956 Shellfish Sanitation Workshops. At the latter Workshop it was requested that the Public Health Service undertake the development of such procedures and criteria. This manual has been developed in accord with this recommendation. Advice and assistance in its development were sought from the control agencies
States, interested federal agencies, Canada
in each of the participating federal departments, and the shellfish industry, as represented by their trade association, the Oyster Institute of North America. Our sincere appreciation is expressed to the many individuals in these agencies and organizations who have contributed time and technical advice to this project.

The provisions of this manual were reviewed and adopted for interim use by the participants at the 1961 Shellfish Sanitation Workshop held in Washington, D. C., on November 28-30, 1961. The manual was used on an interim basis until the 1964 Shellfish Sanitation Workshop held in Washington, D. C., on November 17-19, at which time its use was again discussed and it was thereupon adopted in its present form.

EUGENE T. JENSEN,

Chief, Shellfish Sanitation Branch, Division
of Environmental Engineering and Food
Protection, Public Health Service

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Definitions

National Shellfish Sanitation Program. -- The National Shellfish Sanitation Program for the Certification of Interstate Shellfish Shippers as described in Public Health Service Publication No. 33, Part I, Sanitation of Shellfish Growing areas, and Part II, Sanitation of the Harvesting and Processing of Shellfish.

Rating Officer. -- The PHS employee assigned to appraise the effectiveness of the State Shellfish Sanitation Program.

State shellfish control agency. -- The state agency of agencies having legal authority to classify shellfish-growing areas and/or to issue permits for the interstate shipment of shellfish in accord with the provisions of the National Shellfish Sanitation Program.

State shellfish patrol agency. -- The state agency having responsibility for the patrol of shellfish-growing areas.

Representative number. --

Number of units:[1]	Minimum number to be inspected[2]
less than 25	All
25-54	25
55-59	26
60-64	27
65-71	28
72-78	29
79-86	30
87-94	31
95-105	32
106-116	33
117-130	34
131-147	35
148-167	36
168-191	37
192-222	38
223-262	39
263-316	40

[1] Interstate shippers, boats, trucks, oyster culture rafts, etc.

[2] Units to be chosen at random.

Section A

EXERCISE OF PUBLIC HEALTH SERVICE RESPONSIBILITIES IN THE NATIONAL SHELLFISH SANITATION PROGRAM

1. Discussion. -- The National Shellfish Sanitation Program for the Certification of Interstate Shellfish Shippers was established by a conference of Federal, State, and municipal authorities and representatives of the shellfish industry in February 1925 following a major outbreak of typhoid fever in the United States attributed to sewage-polluted oysters. The formation of the program and its basic concepts are described in "Report of Committee on Sanitary Control of the Shellfish Industry in the United States," Supplement No. 53, to the Public Health Reports. These stated concepts include:

1. Each producing state will be directly responsible for the effective regulation of all production and handling of shellfish within its confines, not merely for the protection of its own citizens but equally for safeguarding such of its product as goes to the other states.

2. The receiving states, being dependent upon the efficiency of the control exercised in the producing states, are entitled to full information concerning

10k the scope and effectiveness of controls actually exercised in each producing state in order that judgment may be formed and action taken accordingly.

To implement the program, the 1925 conference agreed that the producing states would issue "Certificates," i.e., a permit to operate, to shellfish shippers meeting agreed-upon sanitary standards, and that the Public Health Service should serve as a clearinghouse for information on the effectiveness of the state control programs. This latter responsibility was met initially through issuance of a periodic "Progress Report on Shellfish Sanitation" describing the shellfish sanitation program in each state. This procedures was subsequently abandoned in favor of a "program endorsement" concept. Under this concept, the Public Health Service makes a continuing appraisal of each state's shellfish sanitation program to determine if the control measures are in substantial accord with the provisions of the current "Manual of Recommended Practice for Sanitary Control of the Shellfish Industry." The Public Health Service also publishes a list of all shellfish shippers certified by those states having "satisfactory" control programs.

The adoption of the "program endorsement concept changed the role of the Public Health Service from fact-gathering to appraisal. To facilitate the use of the endorsement concept, a numerical appraisal procedure was developed in 1945. Because of the number of variables and lack of detailed instructions, the appraisal procedure tended to be rather subjective except for the inspection of shipper establishments where a more objective procedure was developed on the basis of experience in the milk and restaurant industries.

Experience demonstrated that the unqualified "program endorsement" concept was not entirely satisfactory because of the subjective qualities of the appraisal procedure and the nature of the Public Health Service responsibilities in the National Shellfish Sanitation Program. . These shortcomings were discussed at the 1954, 1956 and 1958 Shellfish Sanitation Workshops. In accord with recommendations made at these meetings, the Public Health Service undertook the collaborative development of an objective appraisal procedure acceptable to the states and the shellfish industry, and the establishment of minimum criteria for Public Health Service endorsement of a state program.

2. Procedure. -- the Following procedure will be observed by the PHS in fulfillment of its obligation in the National Shellfish Sanitation Program:

a. Each state desiring to participate in the National Shellfish Sanitation Program will submit a formal request to the PHS Regional Health Director: Provided, 12k That this requirement will apply only to states entering the program on an original basis or after a lapse in participation. This request, to be signed by the senior official of the state agency having primary responsibility for shellfish sanitation control, shall include a statement to the effect that an interagency agreement exists between the state agencies sharing program responsibilities and that the state recognizes its responsibilities and obligations in the National Shellfish Sanitation Program, and is willing to assist the PHS in making necessary reviews and inspections for the state program appraisal. State participation in the National Shellfish Sanitation Program can thereafter be continuous; i.e., states will not have to file an annual notice with the PHS of their intent to participate in the program subsequent to the initial request. However, the regional offices may, at their discretion, request that states signify yearly their desire to participate in this program for the following fiscal year of the state. A state may withdraw from the National Shellfish Sanitation Program at any time upon written notification to the Regional office of the PHS.

b. PHS will complete a yearly appraisal of each state shellfish sanitation program, utilizing the procedures described in this manual. Field visits will be prearranged with states. PHS will initiate arrangements k

for such visits. PHS will submit trip reports to the states describing any corrective actions which should be taken by the states.

c. PHS will make periodic spot checks of states shellfish sanitation activities, particularly patrol and plant sanitation operations.

d. PHS will publish a yearly report on the status of the National Shellfish Sanitation Program. This report will describe progress made in both administrative and technical aspects of the program, will discuss problems which must be faced by the program, and will present a statistical review of the state activities. Neither comparative nor specific ratings for individual states will be shown in this yearly status report. The report will be made available to all persons interested in the National Shellfish Sanitation Program and, if feasible, will be published in a condensed form in a suitable technical journal.

e. A state program with a rating of less than 70 percent in any one of the eight identified program elements--general administrative procedures, laboratory, sanitary survey, relaying, depuration, patrol, harvesting, and shucking-packing -- will not be eligible for endorsement by the Public Health Service 90 days after being formally notified of the rating unless the state demonstrates that suitable corrective action has been taken. Withdrawal of the state program endorsement will be initiated by the PHS Regional Office after discussion with the appropriate state officials, and will be subject to review through established PHS policy channels at Headquarters level. If the state desires participation in the National Shellfish Sanitation Program subsequent to PHS withdrawal of endorsement, the director of the state agency having primary responsibility for shellfish control must make application to the Regional Health Director for reappraisal of the state's program. In submitting this application, the state shall describe the measures taken to correct the noted deficiencies.

f. In an emergency situation, the PHS will take immediate steps to temporarily suspend endorsement of a state program when it is found that a condition exists in which interstate shipment of shellfish therefrom would be likely to cause disease. Such action will be initiated by the Regional Program Director through established communication channels after first advising the state of the proposed action.

g. PHS will publish a periodic list of shellfish shippers certified by the endorsed states.

h. PHS will keep the Food and Drug Administratio informed of technical and administrative developments in

5k the National Shellfish Sanitation Program in accord with the existing intradepartmental agreement (Appendix A).

i. PHS will keep the Fish and Wildlife Service fully informed of technical and administrative developments of the National Shellfish Sanitation Program in accord with the existing interdepartmental agreement (Appendix B).

Section B

APPRAISAL PROCEDURE

1. Discussion. -- To provide satisfactory public-health protection to consumers of shellfish, a state shellfish sanitation program should include the following elements: legal authority; evaluation of sanitary conditions of growing areas; sanitary control of relaying and purification; prevention of harvesting from polluted areas; sanitary supervision of the harvesting and packing of shellfish; and laboratory facilities. The specific requirements for these elements are described in Parts I and II, Manual of Operations for Sanitary Control of the Shellfish Industry, PHS Publication No. 33. These requirements are revised periodically through joint action of the interested parties.

16k PHS endorsement of a state program is contingent upon the attainment of a satisfactory level in each of the several critical elements. In appraising these several program elements, the Public Health Service will be guided by the most current revision of PHS Publication No. 33, Parts I and II. The complete cooperation of the state is expected in making these appraisals; e.g., it will be the responsibility of the state to produce evidence that all program elements are, in fact, satisfactory. States will supply the rating officer with copies of all necessary reports, and with such details of sanitary surveys and inspections as he may require to complete the appraisal.

The primary purpose of the program appraisal is to evaluate the degree of compliance with the agreed-upon practice of the National Shellfish Sanitation Program. The appraisal will delineate specific areas of strength or weakness in the state's shellfish sanitation program, and may point out ways in which state programs may be improved; however, this should not be confused with the primary purpose of the appraisal.

Rating appraisals will be initiated annually by the Public Health Service unless advised that the state no longer wishes to participate in the National Shellfish Sanitation Program. The rating officer will make the necessary arrangements with the state officials well in

7k advance of the date selected, and will ordinarily make all phases of the review in the company of state officials. The rating officer will also normally make a limited number of spot checks of patrol activities and plant sanitation levels each year. The amount of time required to complete the evaluation of a state program will ordinarily depend upon the size, importance, and complexity of the shellfish industry in the state.

The evaluation of state laboratory procedures will ordinarily be performed by a laboratory review officer with recognized competence in the area being evaluated; i.e., bacteriology or toxicology. Copies of laboratory evaluation will be included in the overall state program appraisal report.

Two copies of the state program appraisal, together with the regional recommendation for endorsement, will be forwarded to the PHS Headquarters office by June 30 of each year. The Regional office will also forward copies of the completed review to the Senior Administrative Officer of each state agency involved in shellfish sanitation activities. Any necessary conferences between the regional staffs and state staffs shall normally be completed prior to the forwarding of the final appraisal to the Headquarters office. The format of the report is described in section C. In the event a state disagrees with their

18k appraisal, it is understood that they have the right of appeal to the PHS Headquarters office: Provided, Such appeals are made within 30 days of their receipt of the appraisal.

2. Administrative Practices. -- The rating officer will complete Form I in evaluating the adequacy of the legal and administrative elements in the state's control program. Instructions for completing this form will be found on pages 7 and 8. Data for this review will ordinarily be obtained from analysis of state records; however, these data will be subject to confirmation through field observations. Some states have delegated the responsibility for certain administrative aspects of the program to county, district, or local governmental jurisdictions. In all such cases, the state will be considered as responsible for satisfactory operation. The states will also be expected to have adequate data readily available on which the rating officer can justify an opinion as to the adequacy of these decentralized operations.

FORM I.—*Appraisal of general administrative procedures*

State Period Rating officer

The number and letter subitems below refer to PHS Publication No. 33, Part I, Section A.	Weight	Weight applicable	Percent compliance	Score
1. Adequate legal basis for—				
a. Classification of actual or potential growing waters	10			
b. Patrol, apprehension and effective prosecution	10			
c. Supervision of relaying, depletion, wet storage and purification	5			
d. Regulating the handling of shellstock	3			
e. Preventing ceritfied shippers from handling shellfish from noncertified sources	3			
f. Establishing sanitary standards for all classes of certified shellfish shippers	2			
g. Emergency restriction on harvesting or shipping	5			
h. Preventing the sale, shipment or possession of nonidentified shellfish	2			
2. General administrative practices—				
a. Requirements applied to all actual or potential growing waters	10			
b. Requirements applied to all commercial harvesters	10			
c. Requirements applied to all persons (excluding harvesters) handling shellfish prior to the certified shipper	10			
d. Certificates issued only to establishments meeting basic construction requirements and revoked when sanitation rating falls below 80% or if item is repeatedly violated	10			
e. Adequate central records of sanitary surveys, patrol activities (including arrests and results of prosecution) and plant inspections	10			
f. Guidelines observed in the issuance of certificates	2			
g. Regional office notified of growing area reclassification	1			
h. Plant inspectors have necessary inspection equipment	2			
i. Interdepartmental memorandum of understanding complies with manual requirement	5			
Total			▨	
	Final rating			

Are controls based on statutory or administrative law?

Give appropriate paragraph references to laws or regulations.

Have there been any changes in laws or regulations since last evaluation? If so, describe.

REMARKS: (Discuss any significant differences in State requirements for interstate and intrastate shippers.)

Instructions for Completion of Form I

Item 1: The subitems listed under this item relate to the legal authority for the state's program. Review of the legal aspects of the state shellfish laws and regulations shall be made with the Regional Attorneys. Full credit is to be given on each subitem if, in the Regional Attorney's opinion, it is the intent of the law or regulation regardless if the state is actually carrying them out in practice. Deductions should be made from item 1, Form 1, only if the state clearly does not have adequate legal authority to carry on a program, or if the laws and regulations are not enforceable because of their nature. Deductions should also be made under this item if the legal authority is lacking, even though field studies indicate a satisfactory program. Partial scores may be given for the individual items.

Appropriate deductions should be made in Forms III, IV, VI, or VII if field investigations indicate that the subitems listed under item 1, Form 1, are not being complied with.

Item 2: This item relates to the administrative practice used by the state

(a) Partial credit will not be given.

(b) Partial credit will not be given.

1k

(c) Partial credit will not be given.

(d) Partial credit will be given. (In the event that inspection discloses establishments, which are not eligible for certification as described in Part 1, immediate arrangements will be made by the states for the correction of the observed defects or for state suspension or cancellation of the certificates. If the state does not notify the rating officer that such steps have been promptly taken, the rating officer will advise the state control agencies, the Food and Drug Administration district office, and the Public Health Service Headquarters of the defective establishments.)

(e) (1) Credit shall be based on the number of complete growing area files relative to the total number of growing areas. Growing areas may be identified by number, name, political or geographic boundaries.

(2) Monthly patrol reports are to be submitted to the PHS regional office. Credit will be based on the number of such reports received, and the adequacy of the information contained therein.

(3) Monthly summaries of plant inspection activities are to be maintained by the state in a central inspection report file. Credit

22k given will be based on the proportion of plants inspected relative to the number which should have been inspected. Shucker-packers are to be inspected on a monthly basis during periods of operations. Other classes of shippers to be inspected according to a frequency acceptable to the state and the Regional office. This latter inspection frequency will be indicated in "Remarks."

(f) Credit will be given on the basis of compliance with the basic item. Each numbered subitem, i.e., content, changes, prior shipment, cancellations, and use of mailing lists will be given equal weight. Deductions will not be prorated on the basis of observed violations.

(g) Any violation will forfeit the entire item.

(h) Credit should be given on the basis of equipment provided all inspectors. Partial credit may be given on the basis of number of inspectors involved, and equipment deficiencies.

Item 3: Intrastate Sale of Shellfish. -- If it is clear from a review of the state regulations or inspection of intrastate shippers that standards for intrastate shippers are lower than those for National Shellfish

23k Sanitation Program shippers, this observance, together with a discussion of the problem and the total number of intrastate shippers, should be noted in "Remarks."

3. Laboratory Procedures. -- Attempts will ordinarily be made to have laboratory reviews made by PHS staff members who are particularly competent in the area being reviewed. However, the rating officer will be expected to discuss the laboratory procedures with appropriate state officials to ascertain that generally acceptable methods are used. The rating officer will originate the request for service of the laboratory review personnel.

The rating which is given for laboratory procedures will be based upon the number of laboratories involved and the degree to which these laboratories use currently accepted methods in making bacteriological, toxicological, chemical, and physical determinations. The rating officer should note that not all such determinations are made exclusively by laboratory personnel; e.g., salinity measurements may be made by the field staff using a hydrometer. Form II should be completed on the basis of information obtained by the rating officer in (1) discussion with state laboratory and staff personnel, and (2) on detailed information submitted to the rating officer by the laboratory review specialists.

The laboratory review officer will direct his appraisal of state laboratory facilities to the rating officer. The report should be such as to enable the rating officer to complete Form II. A supplementary narrative report which can be transmitted to the responsible state official will also be provided.

4. Growing Area Survey and Classification. -- The rating officer will ordinarily emphasize the appraisal of the "Growing Area Survey and Classification" aspect of state programs because of the established relationship between shellfish-caused disease and pollution of growing or holding areas.

Appraisal of this element will usually include (1) an office analysis of all sanitary surveys and resurveys of all "Approved," "Conditionally Approved" and "Restricted" areas; (2) field visits to a representative number of the "Approved" and "Restricted" areas; and (3) field visits to all "Conditionally Approved" areas. The field visit will enable the rating officer to partially verify the sanitary survey data in the state files. The rating officer will place emphasis on his appraisal of variable sources of pollution, i.e., sewage systems and boats, and on the degree to which such sources of pollution were considered in area classification.

Form II.—*Evaluation of laboratory procedures*

State			Period	
Rating officer				
Part A: Bacteriological				
Location of laboratory	Weight	Items applicable	Percent compliance	Score
Subtotal	40			
Part B: Toxic Shellfish Poison				
Subtotal	40			
Part C: Chemical and Physical				
Subtotal	20			
Total				
		Weighted final rating		

Remarks:

Instructions for Completion of Form II

1. Location. -- The name or location of each laboratory should be indicated. In Part C, the type of examination made should be indicated by a suitable code to be explained in "Remarks."

2. Weight. -- The relative importance of the laboratory in making the particular type of examination should be indicated. Note that the subtotals equal 40 for bacteriological examination, 40 for toxic shellfish poison, and 20 for chemical and physical determinations.

3. Appropriate entries should be made in the column to indicate any items which are not applicable; e.g., many states have no reason to assay for paralytic shellfish poison.

4. Percent compliance should be based on the analysis of reliability of techniques used by the particular laboratory.

5. Score. -- Score is the product of the weight and percent compliance.

6. The final weighted result is computed by dividing the total "Score" by total "Items applicable." The results should be converted to a percentage by multiplying by 100.

7. The name of the laboratory review officer, or officers, should be entered under "Remarks."

27k The rating officer will review each survey jointly with his counterpart in the state shellfish control agency. If in the course of review, defects were noted which might result in the interstate spread of disease, the rating officer shall immediately notify the senior officer of the state shellfish control agency and the Public Health Service Headquarters office of these conditions. The rating officer and the state officials shall take whatever steps may be necessary and feasible to prevent the interstate shipment of such contaminated or dangerous shellfish.

Form III, Evaluation of Sanitary Surveys and Resurveys, will be initially completed by the rating officer on the basis of information obtained through his review of the state-maintained growing area files. These data will then be corroborated by field inspection. The rating officer, in the company of a state agency representative, will visit a representative number of approved and restricted growing areas to determine if the information in the growing area files portrays accurately those conditions which influence the sanitary quality of the areas. Where possible, program appraisals should be so scheduled that all "Approved" areas will be reviewed at least once during each 4-year period.

The rating officer will consider the bioassay

28k surveillance program as a component of the sanitary survey in those areas in which toxic shellfish poison may reasonably be expected to occur. An approximate weight of 40 percent should be applied to those areas in which this item is applicable. For example, a growing area sanitary survey might be rated as 87 percent, but it might be determined by inspection that the bioassay surveillance program was defective. In this case, a 40-percent deduction should be made with a resulting value of 47 for the areas involved.

Growing areas having a sanitary survey rating of less than 70 percent should not ordinarily be approved for further harvesting of shellfish for direct marketing.

5. Relaying, Depletion, and Depuration. -- Adequate public-health control of relaying, depletion, and controlled depuration is essential because these practices permit the eventual marketing of shellfish which were initially dangerously polluted. The degree to which these procedures are utilized varies greatly in the several states. Also, the relative importance of effective control varies with the initial quality of the shellfish.

To appraise the effectiveness of relaying, depletion, and controlled depuration operations, the rating officer should review the office records of the state agency and, to the extent possible, should make field checks to

9k verify the accuracy of these records. The rating officer should attempt to observe at least one depletion operation and should review all records of other depletion operations which have been carried on. In completing Form IV, the rating officer should observe the following general guides: (a) the transportation of shellfish between Approved areas is not relaying; (b) the transplanting of seed shellfish, i.e., submarket sized shellfish, is not relaying; and (c) shellfish relaying during periods when shellfish may not be legally harvested for conservation or other reasons is not relaying, provided such operations are concluded at least two weeks in advance of the legal harvesting season. In completing Form IV, the rating officer should allow credit in proportion to the percentage of the relayed shellfish which are handled in accord with the provisions of PHS Pub. No. 33, Part I.

6. Control of Harvesting From Closed Areas. -- In many states the prevention of commercial shellfish harvesting from polluted or toxic areas has importance equal to or greater than that of any other element. However, adequate appraisal of this program element is difficult because of the widely varying technical and administrative situations which are encountered. For these same reasons, the National Shellfish Sanitation Program has not developed patrol requirements with the same specificity as

30k those applied to sanitary survey or plant inspection elements.

The rating officer will concentrate on identifying and evaluating the apparent strengths or weaknesses of the system. The rating officer will not be expected to prove that a state patrol system is inadequate, but only to show that the system is such that violators might go unapprehended or that the prosecution is such that there is sufficient deterrent to violators.

FORM III.—*Evaluation of sanitary surveys and resurveys*

State		Period		Rating officer			
Area		Surveys		Credit for effective date of survey	Quality of survey	Deduction for faulty toxicity surveillance	Score
Designation	State classification	Date of last survey or resurvey	Date of last appraisal				
1	2	3	4	5	6	7	8

Final rating

Instructions for Completion of Form III

Area Designation and Classification. -- Areas may be designated by geographic name, number, or political boundary. The rating officer may, and with concurrence of the state, consolidate adjacent areas into more convenient units to facilitate ratings. Such consolidated areas should be described in terms of latitude and longitude coordinates or by reference to established locations on Coast and Geodetic Survey charts. Information positively locating the area will be included as a supplement to Form III so that future program ratings will be based upon the same general areas. Classifications should be in accord with the definitons of Section C-2, Part I: 1965 Manual of Operations for the Sanitary Control of the Shellfish Industry. The following abbreviation should be used: Conditionally Approved = CA; Approved = A; Restricted = R; and Prohibited = P.

If the state does not use this classification system, a footnote explaining the state system shall be appended to Form III. Each designated growing area, regardless of its size or relative shellfish production, is to be considered of equal weight and importance in the computation of Form III.

3k Date of Last Completed Survey. -- This date should be obtained from the state area file. If the date is indefinite or if an area file is not available, a note to this effect should be entered in column 2, and be treated as zero in computations. Where a new area is being approved, the date of the initial survey will be entered in column 3.

Date of Last Resurvey. -- This information should be entered in the same manner as in column 3.

Credit for Effective Date of Survey. -- A percentage value will be entered in column 5 according to the following schedule:

Sanitary survey or resurvey within 10 years and reappraisal as follows:

	Credit (percent)
a. Reappraisal within 2 years......	100
b. Reappraisal within 3 years......	85
c. Reappraisal within 4 years......	10
d. Reappraisal over 4 years........	0

Sanitary survey over 10 years and no resurvey: zero percent credit.

Quality of Survey. -- The rating officer will review survey and resurvey area files and will assign percentage values to each area on the basis of the following criteria:

	Percent
Sanitary evaluations of sources of pollution including sewerage systems....	40
Evaluation of hydrographic factors responsible for spread of pollution	10
Bacteriological, chemical (including pesticides), and radiological survey of shellfish growing areas as indicated....	25
Analysis of the interrelationships of the foregoing factors and resulting area classification........................	25

Partial credits may be allowed in using the above criteria.

The weight which will be attached to any particular item will depend upon prevailing conditions; e.g., in considering a growing area remote from any source of pollution, the rating officer will recognize that the sanitary quality of the area can be established without extensive field or laboratory study.

The rating officer will make suitable adjustments in the rating assigned on the basis of the review if field conditions are found which indicate that the survey is incorrect, or if significantly changed conditions are not reflected in the area classification.

A brief narrative statement shall be prepared describing each deduction for each growing area.

k

Deduction for Faulty Shellfish Toxicity Surveillance. -- The surveillance program, incorporating an assay procedure, will be considered as a component of the sanitary survey in those areas in which shellfish toxicity may reasonably be expected to occur. If the inspection shows that the surveillance program is defective, then the rating officer should apply a 40-percent deduction to the area sanitary survey rating (product of col. 5 and col. 6).

Score. -- Score is the value which results when the product of column 5 and 6 is divided by 100, minus deduction for faulty area surveillance program for naturally occurring shellfish toxins.

A brief, narrative statement should be prepared describing each deduction.

Final Rating. -- Final rating is the aritmetical average of the scores of the designated growing areas expressed as a percentage.

Form IV.—*Control of relaying and depletion operations*

1. Percentage of total State shellfish production which is relayed ------ percent.

	Weight	Applicable	Percent	Score
2. Effectiveness of relaying controls:[1]				
a. Written approval for each relaying and depletion operation	10			
b. Under immediate supervision of State including patrol of relaying area and adequate tests.				
(1) Supervision of relaying operations	20			
(2) Patrol of relaying areas	10			
(3) Records of water quality	5			
c. Permission to relay shellfish only to responsible person	5			
d. Shellfish held for adequate period of time				
e. Relayed shellfish harvested only by wirtten permission	10			
f. Relaying areas designated and identified	5			
3. Effectiveness of depletion controls:[2]				
a. Under immediate supervision of State including patrol of relaying area	20			
b. Effectiveness of depletion operation	10			
c. Evaluation of need for new depletion operations	5			
			▨	
Final rating				

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[1] Items refer to Section D, Part I, PHS Pub. No. 33.

[2] Items refer to Section E, Part I, PHS Pub. No. 33.

7k Instructions for Completion of Form IV

Item 1. Percentage of Shellfish Relayed. -- State records should be reviewed and, where possible, verified by discussions with shellfish shippers or with other state agencies which share responsibility for supervision of the operation.

Item 2. Effectiveness of Relaying Controls (a,b, and c). -- The rating officer will not be expected to demonstrate that the control system is unreliable, but only that the facilities and organization which the state has provided are such that violations might reasonably be expected to occur. This attitude must be adopted since it is obviously impossible for the rating officer to personally observe each relaying operation. Consequently, discovery of a violation by the rating officer would be only through accident or coincidence.

The rating officer may make partial deductions for an item if it is clear that the deficiency is applicable to only a portion of the state's relaying program.

(d) The effectiveness of relaying depends upon the shellfish being left in the approved area for a period of time sufficient for purification to take place. If any violation is found of this item, the credit for the entire relaying item will be forfeited. The item will be assumed

38k to be violated if records indicate that shellfish have been held in the area for less than 14 days at a suitable temperature unless the state has satisfactory evidence tha a lesser period of time is adequate to accomplish purification.

(e) State records should be consulted and verified by discussions with shellfish dealers and with other state agencies that share responsibility for this operatio

(f) Credit will be in proportion to the number of areas that are properly identified.

Item 3. Effectiveness of Depletion Controls.

(a) Same as Item 2 (a,b, and c), supra.

(b) The effectiveness of depletion operations depends upon all market shellfish and as many of the smaller size shellfish as can be gathered by reasonable methods being removed from the area.

(c) Evaluation for need of new depletion operations to be carried out at intervals to prevent the development of market-sized shellfish is a necessary requirement of the depletion operation.

FORM V.—*Depuration*

State **Period**

Rating Officer

1. Number of depuration plants ------------------------------

2. Percentage of total State shellfish production subjected to controlled depuration ------------------------------

3. Effectiveness of depuration

Item [1]	Weight	Applicable	Percent	Score
(a) Demonstrated effectiveness	------			
(b) Operating procedure	20			
(c) Bacteriological quality of water	40			
(d) Chemical quality of water				
(e) Shellfish washed before purification	3			
(f) Shellfish culled before purification	10			
(g) State supervision	5			
(h) Laboratory control	10			
(i) Trained operator	5			
(j) Limited access	2			
(k) Worker health	5			
(l) Controlled harvesting	(1)	▨		▨
Total			▨	
Weighted total				
Deduct for improper harvesting				

[1] Letter refers to Part 1, Section D, Item 2.

40k

Instructions for Completion of Form V

3. Effectiveness of depuration

(a) A depuration plant operating procedure shall be developed for each depuration plant. The procedure should demonstrate that the method used will result in effective purification. Any violation of this requirement will result in zero credit regardless of the scores obtained on other aspects of the purification operation. However, the rating officer should complete the entire evaluation of the item even though the portion dealing with them (a) is violated.

(b) Credit for this item will depend upon (1) receipt of the state's operating procedures; and (2) their completeness.

(c through f) Partial credit may be allowed for these items.

(g) Same as item (a), supra.

(h) Credit for this item will be based on the degree to which the necessary tests are made. If non-standard procedures are used, deductions should be made on Form II, Laboratory Procedures, Part B.

(j and k) Partial credits may be allowed for these items.

41k

(1) The rating officer shall assure himself that the state has an administrative system which insures that shellfish harvested from "Restricted" areas will, in fact, be submitted to purification before marketing. However, the rating officer will not be expected to demonstrate that lapses have actually occurred. If there is any deficiency in this item, the entire item for the purification plant will be forfeited.

A necessary step preliminary to the evaluation of a state patrol program is a joint State-PHS evaluation of the patrol problems, and a determination of the type of patrol organization and extent of patrol coverage that is required to achieve the desired results. The results of such conferences between representatives of the state and the PHS regional staff shall be documented and kept on file in the Regional Office. This patrol document shall review and clarify the following elements: (1) method of identification of closed areas; (2) type of patrol problem; (3) listing of areas to be patrolled; (4) frequency and nature of patrol; (5) type and frequency of reporting; and (6) public-educational measures. The patrol document shall be reviewed annually and be revised when necessary.

42k The rating officer should recognize that not all patrol activities may be carried out at the state level. However, the state delegation of responsibility for elements of the control program to local organizations will not absolve the state from the obligation of providing information on the effectiveness and completeness of these operations. The rating officer should, therefore, consider the local patrol operations as an integral part of the state program.

7. Evaluation of Harvesting Practices. -- Where possible, the rating officer should inspect a representative number of shell stock harvesting boats and prepa a numerical evaluation comparable to the sanitation rating for shucking plants. However, in some instances, this expenditure of staff time cannot be warranted because of the relative public-health significance of the item. In lieu of such a direct inspection, the rating officer will then (1) evaluate the state's system for obtaining approv sanitary measures, and (2) inspect only a small number of harvesting boats and/or transport conveyances. This infor mation will be entered in Form VII.

8. Evaluation of Shucking-Packing Practices. -- Representative numbers of packers, and repackers, will be inspected by the rating officer. Inspections should be recorded and ratings calculated as indicated in Appendix B, Part I, 1965 Manual of Operations for the Sanitary Cont

3k of the Shellfish Industry. Summary ratings for the several classes of shippers should be computed on PMS-770 and SS-3 forms. Copies of the individual inspection reports will not ordinarily be included in the rating officer's report.

In making these inspections the rating officer may discuss results with the state's counterpart official and may leave copies of the inspection report with the state official. If requested to do so by the state representative, the rating officer will also review the results of each inspection report with the plant management.

The ratings obtained through the inspection of these several classes of establishments will be combined into a final appraisal rating for shucking-packing practices as shown on Form VIII.

FORM VI.—*Evaluation of growing area control measures*

Part A

Area description	Adequacy of marking (percent)	Adequacy of patrol (percent)	Score
Final rating			

Part B

Patrol Equipment Review

Part C

Enforcement Proceedings

Instructions for Completion of Form VI

Part A

Area Description: As the first step in the calculation of the numerical ratings for the patrol activities, the rating officer should prepare a list of those areas which are not approved for commercial harvesting. This information should be entered in column 1. Each area should be so described that it can be readily identified in subsequent ratings.

Area Marking: The rating officer should visit a representative number of these areas to determine if the applicable requirements for boundary markers or area posters have been met. The degree of compliance will be determined for each area visited. This information will be recorded in column 2. In addition, the rating officer should visit "Prohibited" areas to attempt to determine any violation of the closure orders. In some instances, the rating officer should revisit areas to determine if the required markers and posters are still present. Any information obtained in such re-evaluations should be reflected by suitable corrections in Form VI.

Area Patrol: In appraising the patrol activities, the rating officer should compare State records of patrol activities with the previously-agreed upon levels of activity. The extent to which these two values agree should be entered in column 3 as a percentage. In the absence of complete records, the rating officer will ordinarily be unable to complete a review of this element of the State program. In such instances, no credit will be given for these elements for the State operation.

Score: The value entered for "Area Marking" and "Patrol Effectiveness" should be combined according to the following weights: Marking, 20 percent; Patrol, 80 percent. The resulting value should be entered in column 4, "Score (percent)."

Part B

The rating officer will prepare a narrative report on the appraisal of the equipment indicated in the policy document as necessary to carry on an effective growing area control program.

Part C

The rating officer will prepare a narrative report giving the number of apprehensions, the disposition of the cases, and an analysis of the factors which influenced the disposition of the cases. If the State agencies' experience in the courts suggests that State laws cannot be enforced effectively, an appropriate deduction should be made under item 1, page 7.

FORM VII.—*Evaluation of harvesting practices*

A. Number of State licensed harvesters ____________

B. Estimated number of harvesting boats in State ____________

C. Number of harvesting boats inspected ____________

D. Estimated number of trucks used for shell stock transportation ____________

E. Number of trucks inspected ____________

Item	Weight	Item applicable	Percent compliance	Score
Construction and cleanliness of boats	40			
Construction and cleanliness of trucks	30			
Washing shell stock	10			
Waste disposal from boats	20			

Remarks ____

Shell-stock shipper inspection summary

INSTRUCTIONS

A. Transfer information to columns 1, 2, and 3 from Inspection Reports (PHS-769-3)

B. Multiply each "*Final Plant Score*" by adjacent "*Number of Employees*" to obtain "*Weight.*"

C. Add column 3 and enter "*Total*" on final sheet of computation.

D. Add column 4 and enter "Total" on final sheet of computation. Divide "*Total Weight*" by "*Total Number of Employees*" to obtain "*Final Rating.*"

State	Number of shell-stock shippers	Number inspected	Date

Certificate number (1)	Final plant score (2)	Number of employees (3)	Weight (4)
	Total----		
		Final rating--------------	

Remarks____

PHS-770
REV. 1-58

SHELLFISH SHUCKING-PACKING PLANTS INSPECTION SUMMARY

Page ______ of ______ pages

INSTRUCTIONS

A. Complete all blocks above column headings on each summary sheet.

B. Transfer information to columns 1, 2, 3, and 5 from inspection reports. Record number of shuckers to nearest 5. If less than 5 shuckers record as 1.

C. Subtract "DEDUCTIONS" from "INITIAL PLANT SCORE" to obtain "FINAL PLANT SCORE."

D. Multiply each "FINAL PLANT SCORE" by adjacent "NUMBER OF SHUCKERS" to obtain "WEIGHT."

E. Add column 5 and enter "total" on final sheet of computation.

F. Add column 6 and enter "total" on final sheet of computation. Divide "TOTAL WEIGHT" by "TOTAL NUMBER OF SHUCKERS" to obtain "FINAL RATING."

STATE	NUMBER OF SHUCKER-PACKERS	NUMBER INSPECTED	DATE

CERTIFICATE NUMBER 1.	INITIAL PLANT SCORE 2.	DEDUCTIONS 3.	FINAL PLANT SCORE 4.	NUMBER OF SHUCKERS 5.	WEIGHT 6.
REMARKS:			TOTALS		
				FINAL RATING	

Use additional copies of this Form for continuation sheets, if necessary.

Form VIII.—*Evaluation of shucking-packing practices*

Type of shipper	Summary rating (percent)	Number of shippers	Weight	Score (percent)
Reshippers				
Shell-stock				
Shucker-packers				
Repackers				
Total			▨	
		Final rating		

Remarks____

Instructions for Completing of Form VIII

Summary Rating.—The summary ratings for each of the several classes of shippers (Forms PHS-770, SS-3, etc.) should be entered in this column.

Number of Shippers.—The number of each class of shipper should be brought forward from the summary rating forms.

Weight.—Values for this column should be determined by dividing each type of shipper by the total number of shippers.

Score.—Multiply column 2 "Summary rating" by column 4 "Weight" to obtain this value.

Form IX.—*Summary appraisal of State Shellfish Sanitation Program*

Individual program elements	Rating (percent)
1. General Administration Procedures	
2. Laboratory procedures	
3. Sanitary survey	
4. Relaying and depletion	
5. Controlled purification	
6. Patrol	
7. Harvesting	
8. Shucking-packing	

Remarks____

Section C

PREPARATION OF RATING OFFICER'S REPORT

The rating officer will prepare a report on each state shellfish sanitation program according to the following outline:

A. Introduction. -- The introduction should indicate that the appraisal has been made in accord with Part III: "Public Health Service Appraisal of State Shellfish Sanitation Programs -- Manual of Operations -- National Shellfish Sanitation Program" The names and titles of all individuals participating in the appraisal should be given.

B. Summary of State Shellfish Sanitation Programs.

1. Form IX, Summary of Appraisal.
2. Narrative report. The narrative report should be concise and should include:
    (a) A statement as to the general status of the state's shellfish sanitation program.
    (b) A brief discussion of needs for specific program emphasis.
    (c) An appraisal of the adequacy of funds, personnel, and facilities available to the state agencies for carrying out all phases of the program.

C. Detailed Appraisal of Individual Elements of State Shellfish Sanitation Program.[1]

1. Form I -- Appraisal of Legal and Administrative Procedures.

2. Form II -- Evaluation of Laboratory Procedures

3. Form III -- Evaluation of Sanitary Surveys and Resurveys.

4. Form IV -- Control of Relaying Operations.

5. Form V -- Controlled Purification.

6. Form VI -- Evaluation of Growing Area Control Measures.

7. Form VII -- Evaluation of Harvesting Practices.

8. PHS - 770-Shellfish Shucking-Packing Plants Inspection Summary.

SS-3 - Summary of Shell Stock Shipper Inspections.

9. Form VIII -- Evaluation of Shucking-Packing Practic

10. Form IX -- Summary Appraisal of State Shellfish Sanitation Program

11. Form X -- Combined Summary Rating (Appendix C).

12. Supplementary Narrative Report as needed to clarify information on the foregoing Forms and as called for by the appraisal procedure.

D. Appendix. -- Additional information necessary to clarify the state appraisal. Photographs may be used.

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[1] Any forms not applicable to the program being appraised may be omitted from the completed appraisal report.

3k

Section D

SUPPLEMENTAL PROGRAM STATISTICS

The rating officer should assemble and forward the following information to the PHS Headquarters office by June 30 of each year for use in program planning. This material will not be included in the program appraisal forwarded by the regional office to the state agencies.

1. Estimated shellfish production together with any evident trends; i.e., an indicated decline or advance.

2. A brief description of the state organizations responsible for administration of the shellfish sanitation program including, where possible, the names of individuals.

3. An estimate of the total state expenditures for shellfish sanitation activities. This should include an estimate of expenditures for patrol activities.

4. A statement as to the amount of time required to complete the rating survey.

5. Information on any other elements of the shellfish industry which might be helpful in program planning.

6. An estimate of the proportion of shellfish production not subject to National Shellfish Sanitation Program requirements.

54k 7. A statement of the problems associated with the sale of shellfish from foreign countries not having sanitation agreements with the United States.

8. A statement describing state control over the use of shellfish in products not covered directly by the certification program; e.g., breaded oysters or clams.

9. An estimate of yearly shellfish production from each of the identified growing areas.

Appendix A

Cooperative Agreement Between the U. S. Public Health Service and the Food and Drug Administration Relative to Sanitary Control of the Shellfish Industry, July 20, 1933

The agreement between the U. S. Public Health Service and the Bureau of Chemistry (now the Food and Drug Administration) is hereby reaffirmed. This agreement published in 1925, reads as follows:

In accordance with a cooperative agreement between the Public Health Service and the Bureau of Chemistry (Food and Drug Administration) the Public Health Service will furnish the Bureau of Chemistry (Food and Drug Administration) information regarding insanitary shucking houses k and shellfish growing areas in order that interstate shipments may be dealt with as heretofore under the Federal Pure Food and Drugs Act.

The original agreement is supplemented as follows:

1. U. S. Public Health Service will request shellfish producing states to report all cancellations and withdrawals of shippers certificates of refusals to issue state certificates, and specify in the reports the reasons for such action. On receipt of this information the U. S. Public Health Service will in turn transmit the report to the Food and Drug Administration.

2. The U. S. Public Health Service will inform the Food and Drug Administration whenever the approval of state certifications is withdrawn or withheld.

3. The U. S. Public Health Service will report conditions in shellfish producing areas or in shucking plants which indicate probability that shellfish are being marketed in violation of the Federal Food and Drugs Act.

4. The Food and Drug Administration will inspect the sanitary conditions of all shellfish plants not certified, which may do an interstate business. Reports made of such investigations by the Food and Drug Administration will be furnished to the U. S. Public Health Service, with copies to the state shellfish control agency.

56k 5. The inspectors and agents of the Food and Drug Administration will keep in close touch with state shellfish control agencies and with representatives of the U. S. Public Health Service in matters pertaining to enforcement of the Federal Pure Food and Drug Act.

Appendix B

Memorandum of Understanding Between the Department of the Interior (Fish and Wildlife Service) and the Department of Health, Education, and Welfare (Public Health Service) Relative to the Certification of Interstate Shellfish Shippers

Whereas the Department of the Interior is charged by the Fish and Wildlife Act of 1956 with the responsibility for all matters primarily relating to fisheries; and

Whereas the Public Health Service of the Department of Health, Education, and Welfare is charged with preventing the transmission or interstate spread of communicable disease, and in fulfillment of this obligation has cooperated with the states, shellfish industry, Food and Drug Administration, and Fish and Wildlife Service of the Department of the Interior in a sanitary control program for the certification of interstate shippers of oysters, 57k clams and mussels;

Now therefore in the interests of public health, efficiency, and economy; to insure that consumer confidence will be maintained in commercially produced and distributed shellfish as food; and for the purpose of defining their respective functions the Fish and Wildlife Service and Public Health Service do hereby mutually agree as follows:

The Fish and Wildlife Service, acting in a liaison and advisory capacity, and the Public Health Service, acting in a research and administrative capacity, will cooperate in maintaining a high level of sanitation in the oyster, clam and mussel industries so that shellfish will not contribute to the interstate spread of disease.

The Public Health Service will continue to cooperate with the states, shellfish industry, federal agencies and the Canadian Government in the certification of interstate shellfish shippers. This may be accomplished through shellfish sanitation research, development of technical guides, periodic evaluation of state shellfish sanitation programs, endorsement of acceptable state programs, maintenance of liaison with the Canadian federal agencies responsible for shellfish sanitation, and distribution of a list of state-certified interstate shellfish shippers.

58k The Public Health Service will consult with the Fish and Wildlife Service during all phases of the development of technical guides and in the planning and direction of shellfish sanitation research projects. In the event of an interstate outbreak of disease attributed to a fishery product other than shellfish the Public Health Service will, whenever practicable, consult with the Fish and Wildlife Service prior to the institution of control measures.

The Fish and Wildlife Service, in its advisory capacity and through its qualified liaison representatives, will make available to the Public Health Service any available scientific information pertinent to the development of technical guides or to research projects undertaken by the Public Health Service as a necessary adjunct to the shellfish certification program. The Fish and Wildlife Service will disseminate, through industry contacts, information concerning the intent and the need for the shellfish certification program.

The Public Health Service will continue to request appropriations and to expend funds to support the shellfish sanitation activities described above.

(S) HATFIELD CHILSON,

Acting Secretary of the Interior.

May 22, 1958.

(S) M. B. FOLSOM,

Secretary of Health, Education and Welfa

July 24, 1958.

ERRATA SHEET

Substitute for Page 24 of PART III, National Shellfish Sanitation Program, Manual of Operations.

APPENDIX C

FORM X - Combined summary rating

Program Element	Weight	Item Applicable	% Compliance	Score
1. General Administration Procedures	10			
2. Laboratory Procedures	5			
3. Sanitary Survey	30			
4. Relaying and Depletion	5			
5. Purification or Depuration	10			
6. Patrol	30			
7. Harvesting	5			
8. Shucking-Packing	5			
Weighted total				

Instructions

The final rating obtained by this artifical combination of values is of limited utility; however, such ratings based on a uniform procedure will measure year to year change, and may be used for comparative purposes.

Percent Compliance: Percent compliance values should be entered from Form IX "Summary Appraisal of State Shellfish Sanitation Program."

Score: Each "Item Applicable" and "Percent Compliance" value should be multiplied, with the products being recorded under "Score".

Weighted Total: "Weighted Total" should be readjusted in proportion to the total obtained under "Item Applicable".

61k

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Public Health Service

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2k

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